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PHYSICS

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Pariharabodhanam

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പ്രിയ വിദ്യാർത്ഥികളേ,

തിരുവനന്തപുരം നഗരസഭാ പരിധിയിലെ സ്കൂളുകളിൽ പഠിക്കുന്ന വിദ്യാർത്ഥികളുടെ പഠന നിലവാരം വർധിപ്പിക്കുന്നതിനായി നഗരസഭ നടപ്പിലാക്കുന്ന പദ്ധതിയാണ് 'പരിഹാരബോധനം'. മുൻ വർഷങ്ങളിൽ നടത്തിവന്നിരുന്ന പദ്ധതി ഈ വർഷവും വിപുലമായ നിലയിൽ നടപ്പിലാക്കുകയാണ്. പഠനത്തിൽ പിന്നാക്കം നിൽക്കുന്ന വിദ്യാർത്ഥികളെ കൂടുതൽ കരുതൽ നൽകി മുന്നിലേയ്ക്ക് ഉയർത്തുകയെന്നതാണ് നഗരസഭ ഈ പദ്ധതിയിലൂടെ ഉദ്ദേശിക്കുന്നത്. പൊതുവിദ്യാഭ്യാസ രംഗം കൂടുതൽ കരുത്താർജ്ജിച്ച് മുന്നേറുന്ന ഈ കാലഘട്ടത്തിൽ വിദ്യാർത്ഥികൾക്ക് ഗുണമേന്മയുള്ള വിദ്യാഭ്യാസം ഉറപ്പാക്കുന്നതിനും വിവിധ തലങ്ങളിൽ മികവ് തെളിയിക്കാനുള്ള അവസരമൊരുക്കുന്നതിനും സർക്കാരും നഗരസഭയും പ്രതിജ്ഞാബദ്ധമാണ്. അക്കാദമികവും ഭൗതികവുമായ സൗകര്യങ്ങൾ കൂടുതൽ മെച്ചപ്പെട്ട് കേരളത്തിലെ പൊതുവിദ്യാഭ്യാസ രംഗം ശ്രദ്ധേയമായ മാതൃകയായി മാറിയിരിക്കുകയാണ്. ഈ സന്ദർഭത്തിൽ നമ്മുടെ വിദ്യാർത്ഥികൾക്ക് ഉന്നത പഠനത്തിന് ഉപകരിക്കുന്ന തരത്തിൽ പഠന നിലവാരം മെച്ചപ്പെടുത്തുക എന്നതാണ് നാം ലക്ഷ്യമിടുന്നത്. മികച്ച അധ്യാപകരുടെ സഹായത്തോടെ പഠനം അസ്വാദ്യകരമാക്കി മാറ്റിക്കൊണ്ട് കുട്ടികളെ മികച്ച നിലാരത്തിലേയ്ക്ക് ഉയർത്തുകയെന്ന ലക്ഷ്യത്തിന്റെ സാധൂകരണം കൂടിയാണ് പരിഹാരബോധനം എന്ന ബൃഹത് പദ്ധതി. ഈ പദ്ധതിയുടെ ഭാഗമാകുന്ന എല്ലാ പ്രിയപ്പെട്ട വിദ്യാർത്ഥികൾക്കും അഭിനന്ദനങ്ങൾ അറിയിക്കുന്നതോടൊപ്പം മികച്ച വിജയം ആശംസിക്കുന്നു.

സ്നേഹത്തോടെ

ആര്യ രാജേന്ദ്രൻ എസ്.
മേയർ
തിരുവനന്തപുരം നഗരസഭ

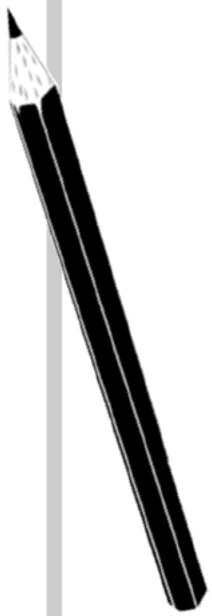
പ്രിയപ്പെട്ട കുട്ടികളേ,

തിരുവനന്തപുരം നഗരസഭാ പരിധിയിൽ വരുന്ന ഹൈസ്കൂൾ, ഹയർസെക്കന്ററി വിഭാഗം കുട്ടികളുടെ പഠനനിലവാരം ഉയർത്താനും പൊതുപരീക്ഷയിൽ ഉയർന്ന ഗ്രേഡ് കരസ്ഥമാക്കാനും ലക്ഷ്യമിട്ടുകൊണ്ട് മുൻവർഷങ്ങളെപ്പോലെ പരിഹാര ബോധനം പദ്ധതി ഈ വർഷവും നടപ്പിലാക്കിവരുന്നതിൽ അതിയായ സന്തോഷവും അഭിമാനവും ഉണ്ട്. ഈ വർഷത്തെ പൊതുപരീക്ഷയ്ക്ക് നേരത്തെതന്നെ തയ്യാറെടുക്കുന്നതിനും എല്ലാ വിഷയങ്ങളിലെ പാഠഭാഗങ്ങളിലൂടെ ആവർത്തിച്ചുകടന്നുപോകാനും പരിചയപ്പെടാനും സാധിക്കട്ടെ എന്ന് ആശംസിക്കുന്നു.

ഡോ.ദീന കെ.എസ്.
ചെയർപേഴ്സൺ
(വിദ്യാഭ്യാസ കായിക സ്റ്റാന്റിംഗ് കമ്മിറ്റി)
തിരുവനന്തപുരം കോർപ്പറേഷൻ

Members participated in the workshop

1. **Sri. Ajith V. R.**
   AKMHS Kudavoor
2. **Sri. Jyothis P.S.**
   GHS Kattachakonam
3. **Smt. Pamela R. David**
   St. Roch's HS Thope
4. **Smt. Preetha Antony**
   St. Philomina's HSS Poonthura
5. **Sri. Saji Y**
   New HSS Nellimoodu
6. **Sri. Sanal Kumar S.A.**
   JPHSS Ottasekharamangalam
7. **Sri. K. Sureshkumar**
   AMHSS, Thirumala, Rtd. Teacher



CONTENTS

Unit
01

EFFECTS OF ELECTRIC CURRENT

Points to Remember

Unit at a glance

1. When current passes through a conductor, the current does some work to overcome the resistance. The work done (W) gets converted into heat (H)
2. The potential difference between two points will be one volt if one joule of work is done in moving one coulomb of charge from one point to the other.
3. The heat generated (H) in a current carrying conductor is directly proportional to the product of the square of the current (I^2) in the conductor, the resistance of the conductor (R) and the time (t) of flow of current .

   $H = I^2Rt$ joule
4. On connecting resistors in series the effective resistance increases. It will be greater than that of the highest resistance in the circuit.
5. On connecting resistors in parallel the effective resistance decreases. It will be less than that of the lowest resistance in the circuit
6. Electric heater, safety fuse etc are devices that make use of heating effect of electricity.
7. Electric lamps makes use of the lighting effect of electricity

   Eg: incandescent lamp, discharge lamp, LED bulb etc
8. Electric power is the amount of energy consumed by an electrical appliance in unit time.

Formulae

1 $I = Q/t$

2. $V = IR$

3. $V = W/Q$

4. $H = I^2Rt$

5. $H = VIt$

6. $H = V^2t/R$

7. $H = Pt$

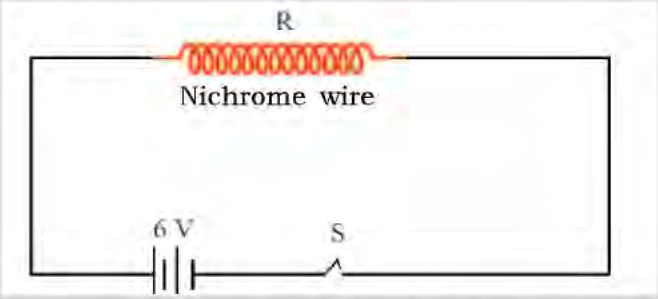
8. in series connection $R = R_1 + R_2 + R_3 \ldots$
9. In parallel connection $1/R = 1/R_1 + 1/R_2 + 1/R_3 \ldots$
10. $P = I^2R$
11. $P = VI$
12. $P = V^2/R$

Units

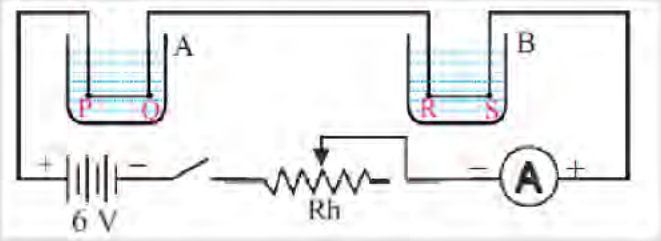
symbols	Quantity	Unit	Symbol
Q	Amount of charge	coulomb	C
I	Current	ampere	A
t	Time	second	s
V	potential difference	volt	V
R	Resistance	ohm	Ω
W	Work	joule	J
H	Heat	joule	J
P	Power	watt	W

Figures

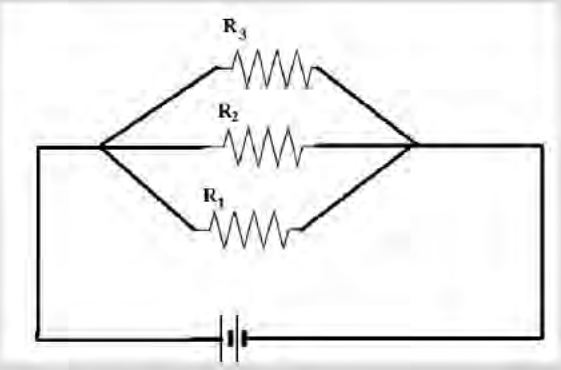
Heating effect of electricity



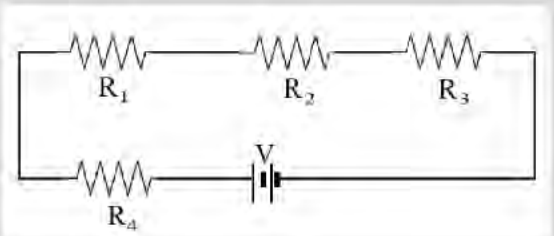
Experiment to prove Joule's law



Resistors in parallel



Resistors in series



WORK SHEETS

1) Find out the relationship from the first pair and complete the other.

a) Work: joule :: heat : .....

b) Resistors in series : $R = R_1 + R_2 + R_3 + ...$

Resistors in parallel: .....

c) Heat : joule :: power: .....

d) To increase the effective resistance: series connection

To reduce the effective resistance : . . . . . .

e) Electric heater : nichrome :: filament lamp: . . . . .

f) Lamp of low efficiency : filament lamp:: lamp of higher efficiency :.....

2) a) Write down the energy change in each of the following

i) Electric iron box

ii) Nichrome wire through which current flows

iii) Electric bulb

iv) discharge lamp

v) LED bulb

b) Complete the following properly

i) $H = I^2 \times$ .....

ii) $H = V \times$ .....

iii) $H = V^2 \times$ .....

iv) $H = P \times$ .....

v) $P = I^2 \times$ .....

vi) $P = V \times$ .....

vii) $P = V^2 \times$ .....

viii) $Q = I \times$ .....

ix) As per Ohm's law $V = I \times$ .....

x) $W = V \times$ .....

xi) in series $R =$

xii) in parallel $1, 1/R =$

xiii) n resistors of the same resistance in series, $R =$

xiv) n resistors of the same resistance in parallel, $R =$

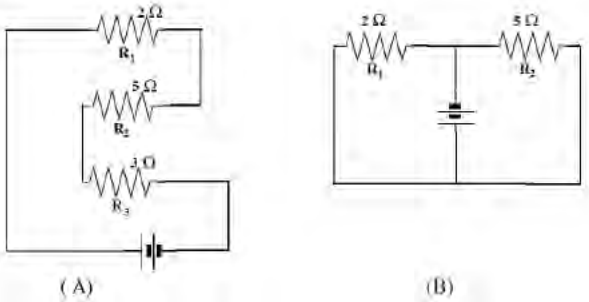
c) Mention the factors affecting the heat developed in a current carrying conductor

d) Which is the main factor that affects the heat developed in a current carrying conductor?

e) The resistance of a circuit is increased without changing the voltage. Will the heat developed increase or decrease?

f) State Joule's law

3) Analyse the figure given below.



(A) (B)

a) What is the mode of connection of resistors in each circuit? In which of the following above circuit will the resistors get

b) The same voltage?

c) Different voltage?

d) The same current?

e) Different current?

f) In which circuit will other resistor work even if one is removed?

g) In which ocircuit will other resistor will not work if one is removed?

h) Higher effective resistance?

i) Lower effective resistance?

In which of the above circuits

j) Can the formula $R = R_1 + R_2 + R_3$ be used ?

k) Can the formula $1/R = 1/R_1 + 1/R_2$ be used?

l) The resistors be controlled using separate resistors?

m) The resistors cannot be controlled using separate resistors?

4) Electric heating devices are designed using the heating effect of electricity.

a) Write down the names of three electric heating devices

b) What is the main part in them?

c) Which substance is used to make the part identified by you?

d) Write down 4 reasons to select this material

e) Name the components of this material

f) What will happen to the heat developed if the resistance in these devices?

g) A resistor of resistance 1Ω is connected in parallel with the main part of the device/ If so, what is the effective resistance?

(less than 1Ω, 1Ω, more than 1Ω)

5) There are some occasions in which there is an excess of in our household circuits.

There is a device to protect the circuit from danger due to the excess flow of current..

a) Name the device used to protect the circuit from danger

b) What is the main part of it?

c) Which are the components of the main part?

d) Which are the occasions in which the current increases very much beyond the limit?

e) Describe each occasion you have identified

f) Is the device connected in series or in parallel in circuits?

g) If the current increases what will happen to the heat developed in the main component?

h) If so what is the result?

i) Describe the working of the device.

j) What are the cares to be taken while fixing a fuse wire in a circuit?

6) We do different works using electricity as well. For this we use devices of different powers.

a) What do you mean by electric power?

b) What is the unit of power?

c) Of 230 V, 60 W, 230 V, 40 W lamps, which has higher resistance?

d) And lower?

e) Which bulb glows brighter, if they are connected in series?

f) And in parallel?

g) The filament in one of these bulbs is broken. What will happen to the brightness of the lamp if the filament is rejoined and lit?

h) Why?

7) Electric lamps works based on the lighting effect of electricity.

a) With which metal is the filament of an incandescent lamp made?

b) Write down 4 reasons for selecting this metal.

c) Why was the bub evacuated in former days?

d) why is the bulb filled with inert gas or nitrogen under low pressure?

e) What is the meaning of the word incandescent?

f) When current is given to the bulb the copper rod that supports the filament does not get much heated while the filament gets heated more. Why?

g) Can nichrome be used in such lamps?

h) Justify your answer.

i) What is the biggest demerit of the filament lamp?

8) Electric lamps works based on the lighting effect of electricity.

a) Write down the names of 4 electric lamps

b) In which lamp is a major part of electricity wasted as heat?

c) In which lamp is energy loss least?

d) What do you know about the structure of a discharge lamp?

e) What do you know about the potential difference to be applied across a discharge lamp?

f) Different discharge lamps will give lights of different colours of light. What is the reason behind?

g) What are the merits of lamp with highest efficiency?

h) Describe the working of a discharge lamp

9) a) Calculate the heat developed if 2A current flows through a 100 Ω resistor fro 5 minute.

b) Calculate the heat developed if 2A current flows under 200V for 10 minute.

c) Calculate the heat developed if 300V is applied across a 200 Ω resistor for 6 minute

d) The following are labeled on some electrical appliances. Calculate the power of each device

i) 2A, 100 Ω ii) 230V, 0.5A iii)200 V,100 &!

e) Calculate the current and resistance of a 40 W, 200 V device

f) A device of power 600 W is working under 230 V. Calculate the amperage

g) Calculate the power of a 1600W, 400V device at 200V.

Sample questions / Model questions

1) Find out the relationship from the first pair and complete the other

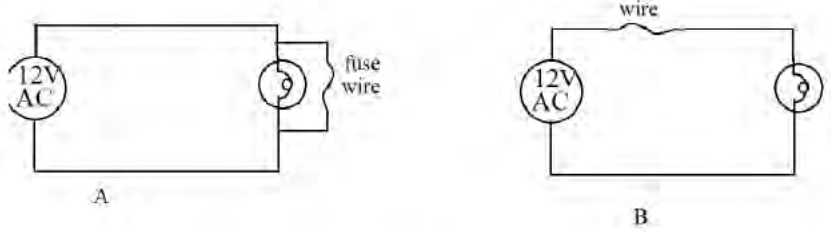
Joule: work:: watt : . . .

2) Which of the following does not belong to the group with respect to electric power?

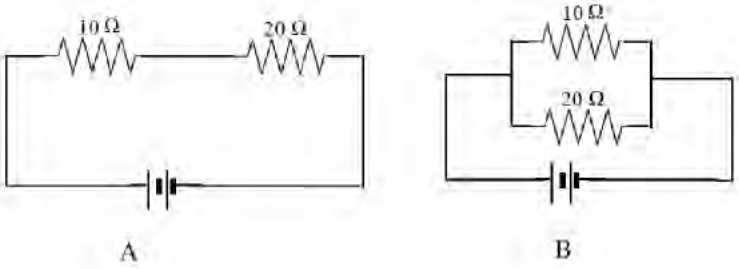
(IR, I^2R, VI, W/t)

3) What is the major drawback of the lamp with least efficiency?

4) Which of the following is the correct circuit?



5) Which resistor will get heated more in each circuit?



6) Calculate the work to be done to move 5 C charge under 200 V potential difference

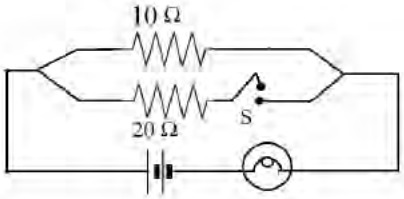
7) Can tyungsten be used to make the heating coil of an electric heater? Why?

8) What should be the mode of connection of resistors so that they will get

a) the same voltage?

b) the same current?

9) Analyse the circuit



a) What do you observe in the circuit?

b) What do you observe on when the switch is turned on?

c) Justify your answer.

10) a) What happens to the heat developed in a circuit, when the resistance is reduced without changing the voltage?

b) Justify your answer

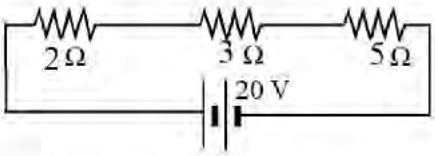
11) A child decided to use a thick copper wire as fuse wire.

a) Do you agree with this?

b) Justify your answer

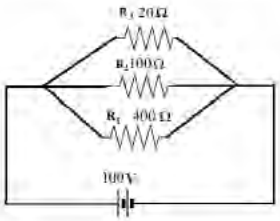
12) Describe the working of a safety fuse

13) Calculate the current in the circuit given below.



14) a) Calculate the current in the circuit given below

b) Calculate the current through each resistor.



Answers

1. a) joule

   b) $1/R = 1/R_1 + 1/R_2 + 1/R_3$

   c) watt

   d) parallel method

   e) tungsten

   c) hm«v

   f) LED lamp

2) a) i) electrical energy into heat energy

   ii) electrical energy into heat energy

   iii) electrical energy into light energy

   iv) electrical energy into light energy

   v) electrical energy into light energy

   b) i) Rt

   ii) It

   iii) t/R

   iv) t

   v) R

   vi) I

   vii) 1/R

   viii) t

   ix) R

   x) Q

   xi) $R_1 + R_2 + R_3 + \ldots\ldots\ldots$

   xii) $1/R = 1/R_1 + 1/R_2 + 1/R_3 + \ldots\ldots\ldots$

   xiii) nr

xiv) r/n

c) intensity of current, resistance, time for which the current flows

d) current

e) decreases (when resistance increases, the current decreases. $H \alpha I^2$)

f) The heat generated (H) in a current carrying conductor is directly proportional to the product of square of current (I^2) in the conductor, the resistance of conductor (R) and the time (t) for which the current flows

$H = I^2Rt$ joule

3) A series B parallel b) B c) A d) A e) B f) B
g) A h) A i) B j) A k) B l) B m) A

4) a) Electric iron, soldering iron, water heater etc

b) Heating coil

c) Nichrome

d) i) High melting point

ii) High resistivity

iii) Ability to remain in red hot condition for a long time without getting oxidized

iii) Sufficient ductility

e) Iron, nickel, chromium

f) Decreases (since current decreases)

g) Less than 1

5) a) Safety fuse

b) Fuse wire

c) Tin and lead

d) Short circuiting and over loading

e) If the positive and negative terminals of a battery or the two wires from the mains come into contact without the presence of a resistance in between, they are said to be short circuited.

A circuit is said to be overloaded if the total power of all the appliances connected to it is more than what the circuit can withstand

f) in series

g) Increases very much

h) Fuse wire melts and breaks

i) During the entire time of passing current through a circuit, a small amount of heat is generated in the fuse wire. But this heat will be will be transmitted to the surroundings. When the current that flows into the circuit exceeds the permissible limit, the heat generated becomes excessive. Since more heat is generated in unit time than the heat transmitted, the fuse wire melts.

j) i) The ends of the fuse wire must be connected firmly in appropriate points.

ii) The fuse wire should not project out of the carrier bases

iii) use a fuse wire of appropriate amperage

6) a) The amount of energy consumed by an electrical appliance in unit time is its power.

b) watt

c) 230 V, 40 W bulb

d) 230 V , 60 W bulb

e) 230 V, 40 W bulb

f) 230V, 60 W bulb

g) Increases

h) Length of the filament decreases, resistance increases and current increases. ($H \alpha I^2$.)

7) a) Tungsten

b) i) High melting point

ii) High resistivity

iii) High ductility

iv) Ability to emit white light in the white hot condition

c) To prevent the oxidation of the filament

d) To increase the longevity by reducing the evaporation of the filament

e) The copper rods supporting the filament and the filament are in series connection. The same current flows through them. Hence the filament having greater resistance gets heated more.

g) no

h) Nichrome cannot be made into a very thin wire since it is not as ductile as tungsten

i) A major amount of electrical energy that we give is lost as heat energy

8) a) filament lamp discharge lamp, LED lamp, fluorescent lamp etc

b) Incandescent lamp

c) LED lamp

d) Electrodes are fitted in a glass tube

e) high potential difference is essential

f) depending on the difference in the energy levels lights of different lights are emitted.

g) i) As there is no filament, there is no loss of energy in the form of heat

ii) since there is no mercury, it is not harmful to the environment

iii) higher life

iv) Higher efficiency

h) When a high potential difference is applied the gas molecules get excited. Excited atoms come back to their original states for attaining stability. During this process the energy stored in them will be radiated as light. Depending on the difference in the energy levels, lights of different colours and other radiations are emitted.

9) a) I = 2A R = 100 Ω , t= 5 ×60s = 300s

$H = I^2Rt = 2 \times 2 \times 100 \times 300 = 120000J$

b) V = 200V, I = 2 A , t = 10 × 60s = 600s

H = VIt = 200× 2 × 600 = 240000 J

c) R = 200 Ω, V = 300V, t = 6×60s = 360s

$H = V^2t/R = 300 \times 300 \times 360/200 = 162000$ J

d) i) I = 2 A, R = 100 Ω $P = I^2R = 2 \times 2 \times 100 = 400$ W

ii) V = 230V, I = 0.5 A P = VI = 230 x 0.5 = 115 W

iii) V = 200V, R = 100 Ω $P = V^2/R = 200 \times 200/100 = 400$ W

e) P = 40 W, V= 200 V

I = P/V = 40/200 = 0.2 A

R = V/I = 200 0.2 = 2000/2 = 1000 Ω

f) P = 600W V = 230V

amperage, I = P/V = 600/230 = 2.6A = 3A

g) $P_{400\,V}$ = 1600 W V = 400 V

$R = V^2 / P = 400 \times 400/1600 = 100\,\Omega$

$P_{200\,V} = V^2/R = 200 \times 200/100 = 400$ W

Sample questions – answers

1) Electric power

2) IR

3) A major amount of electric energy that we give is lost as heat

4) circuit B

5) A $\rightarrow 20\,\Omega$ B $\rightarrow 10\,\Omega$

6) Q = 5C V = 200V

W = VQ = 200× 5 = 1000 J

7) No. If hot tungsten comes in contact with air, it gets oxidized and catches fire immediately

8) a) in parallel b) in series

9) a) the bulb glows b) the brightness of bulb increases

c) Two resistors becomes parallel. Effective resistance decreases and the current increases.

10) a) increases

b) the current increases. The heat is proportional to the square of the current

11) a) no

b) A tick copper wire has a very low resistance and high amperage. It will not easily melt as it has a high resistance. Hence the circuit gets overheated and gets damaged.

12) During the entire time of passing current through a circuit, a small amount of heat is generated in the fuse wire. But this heat will be will be transmitted to the surroundings. When the current that flows into the circuit exceeds the permissible limit, the heat generated becomes excessive. Since more heat is generated in unit time than the heat transmitted, the fuse wire melts.

13) $R = R_1 + R_2 + R_3$

$= 2 + 3 + 5 = 10\ \Omega$

$I = V/R = 20/10 = 2A$

14) $1/R = 1/R_1 + 1/R_2 + 1/R_3$

$= 1/20 + 1/100 + 1/400$

$= (20 + 4 + 1) / 400$

$= 25/400$

$= 1/16$

$R = 16\ \Omega$

$I = V/R = 100/16 = 6.25\,\Omega$

Unit

02

MAGNETIC EFFECT OF ELECTRIC CURRENT

Points to Remember

The direction of the magnetic field lines of a bar magnet is from North to South.
A magnetic field is developed around a current carrying conductor.
The direction of this magnetic field depends on the direction of current passing through the conductor

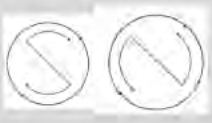
- **Scientists**

1. Hans Christian Oersted – A magnetic field is developed around a straight current carrying conductor.
2. James Clark Maxwell – Right Hand Thumb Rule The direction of magnetic field developed around a current carrying conductor. Also known as Right Hand Screw Rule
3. Fleming – Left Hand Rule. Direction of motion (direction of Force) of a conductor placed in a magnetic field.
   1. Direction of current S → N North pole of the magnetic needle deflects towards→ West (Anticlockwise)
   2. Direction of current N→ S North pole of the magnetic needle deflects towards→ East (Clockwise) Magnetic needle placed above a straight current carrying conductor

Circular coil carrying current

Current flow in clock wise direction - magnetic field lines into the coil. Current flow in anti clock wise direction - magnetic field lines in the outward of the coil A solenoid is an insulated wire wound in the shape of a helix.

The end of the solenoid in which current flows in the clockwise direction will be the South Pole.



The end of the solenoid in which current flows in the anticlockwise direction will be the North Pole.

Bar magnet	Solenoid
Magnetic field developed is permanent	Magnetic field developed is temporary
Polarity of bar magnet cannot be changed.	Its polarity can be changed by changing the direction of current
The strength of magnetic field cannotbe increased beyond a limit	The strength of magnetic field developed can be changed by increasing the currentflow or inserting a soft iron core into the coil.

Strength of an electromagnet depends on :

1. Intensity of electric current
2. Number of turns of the coil
3. Presence of soft iron core
4. Area of cross section of the core

Devices

1. Electric motor

Energy change - Electric energy — mechanical energy

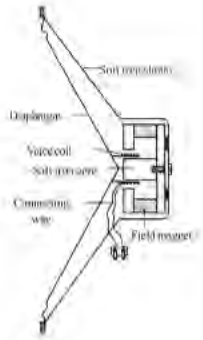
Working principle - motor principle -A conductor, which can move freely and which is kept in a magnetic field, experiences a force when current passes through it and it moves.

Main Parts

N.S – Magnetic field
XY – Axis of rotation of the motor
ABCD – Armature
BB – graphite brushes
R_1,R_2, – Split rings

Split ring commutator :

If the rotation of the armature is to be sustained the direction of current through the armature should continuously keep on changing. The split rings help to change the direction of current through the coil after every half rotation. .



2. **Moving coil loud speaker**

Energy change - Electric energy —>mechanical energy—>sound energy

working principle - motor principle

The parts of a Moving coil loud speaker

Voice coil, Field magnet, Diaphragm, Soft iron core, Connecting wire, Soft iron shield

Activity 1.

Observe the pictures related to Oersted's experiment and write the answers to the following questions?

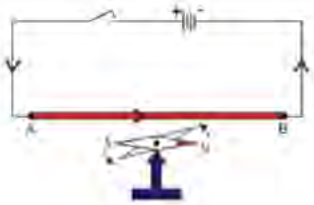


Fig 1

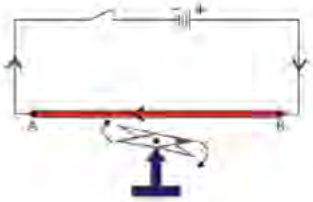


fig 2

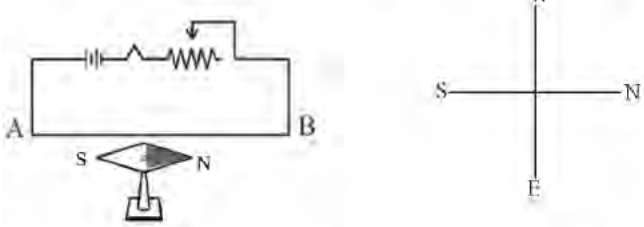
(a) Complete the table by finding in which direction does the north pole deflect.

No	Conductor above the magnetic compass	North pole of the compass deflect (N)clockwise/anticlockwise
fig1	Direction of current B to A	.....
fig2	Direction of current A to B	.....

(b) In which direction does the electron flow if the direction of current is from A to B?

Activity 2

A straight conductor AB is arranged parallel to a magnetic needle as shown in the figure. When switch is off, no current pass through the circuit and the magnetic needle remains parallel in the NS direction.



a. When switch on, which direction does the current flow?

i) A to B ii) B to A

b. What happens to the magnetic needle? What is the reason?

c. In which direction does the north pole of the magnetic needle deflect?

i) East ii) West

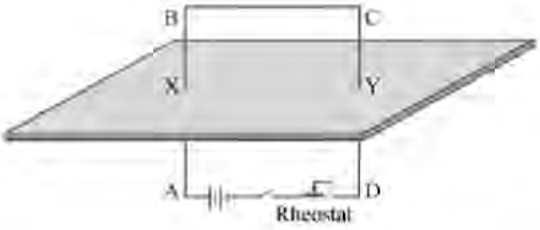
d. Name the law by which the magnetic field of current carrying conductor is determined?

e. How can you reverse the direction of deflection of the magnetic needle?

f. What change will you observe when intenstiy of current is increased ?

Activity 3

A conductor is inserted through a cardboard and kept in a vertical position as shown in the figure. The portions passing through the cardboard are marked as X and Y.



a. Draw the pattern of magnetic field lines around X and Y and mark their direction.

b. On the basis of which rule did you find the direction of magnetic field?

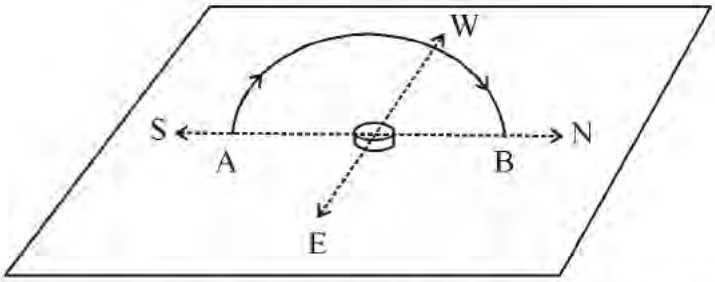
c. Is the direction of magnetic field developed at X and Y the same. Justify your answer.

d. What is the nature of magnetic field and on which factor does the direction of magnetic field developed depends?

e. State the law which determines the direction of magnetic field around a current carrying conductor. Also give another name for the rule.

Activity 4

Observe the figure



AB is part of a conductor with electric current. A magnetic compass is placed under the conductor. When magnetic compass moves to east or west direction, the needle does not deflect after a certain point.

a. To which terminal of the battery is the end A of the conductor connected to?

b. In which direction will the north pole of the magnetic compass needle deflect when current is passed from A to B

c. How will the magnetic field lines appear when the coil is viewed in such away that the current is in the clockwise direction?

d. Name the law which helped you to get the above conclusion?

e. Write the practical definition of this law?

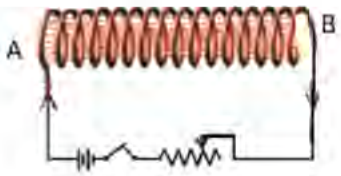
f. What is the reason for the deflection of the compass needle when current is passed through the conductor?

g. Suggest any two ways to increase the deflection of the compass needle beyond a certain point.

h. What will be the magnetic pole of the viewing side of the coil when the coil is viewed in such a way that the current is in the clockwise direction?

Activity 5

Observe the figure and answer the following questions

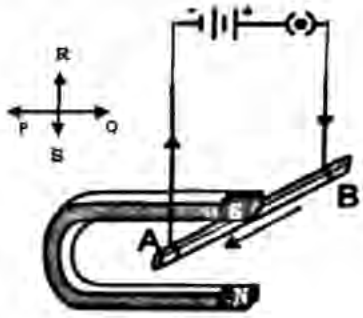


a. What will be the polarity of the end A if it is wound in the anticlockwise direction ?

b) If the current through the solenoid is reversed and the south pole of the bar magnet is brought near the end A will it attract? Explain the reason.

Activity 6

A straight conductor AB is arranged so as to move freely in the magnetic field of a U magnet as shown in figure.



a. The conductor AB deflects when switch is on. What is the reason?

b. Write down the principle behind this deflection.

c. Name two devices that work based on this principle.

d. In which direction will the conductor AB move when the switch is on

e. Name the law used to find the direction of motion of the conductor.

f. Suggest a method to keep the direction of motion of the conductor constant, even when the current is reversed.

Activity 7

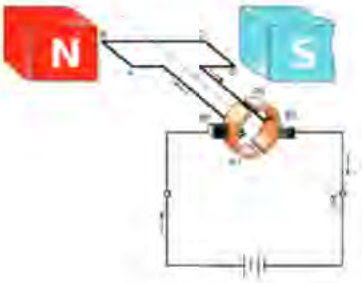
Figure shows representation of Fleming's left hand rule.

a) Write down the one suitable for A and B.

b) State Fleming's left hand rule.

Activity 8

Given below is the figure of electric motor



a) Observe the figure and write down the following N,S,R1,R2,B1,B2, ABCD

b) In which direction does the armature rotate if current is passed through it as shown in the figure (clock wise, anticlockwise)

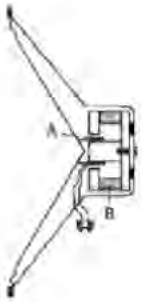
c) Name the split rings and brushes which are in contact with each other during the first half of rotation

d) Name the split rings and brushes which are in contact with each other during the second half of rotation

e) What is the role of split ring commutator in electric motor?

Activity 9

Observe the figure



a) Name the device.
b) What is the energy conversion in this device?
c) What is the working principle?
d) Name the parts A and B.

Activity 10

Some statement regarding the working of loud speaker are given. Arrange them in order

a. Strengthens electrical pulses reaches from the amplifier.

b. The voice coil, moves to and fro rapidly, in accordance with the electrical pulses

c. Thereby reproduces sound.

d. These movements make the diaphragm vibrate,

e. Sent through the voice coil of a loudspeaker.

ANSWER KEY

Activity 1

a.

No	Conductor above the magnetic compass	North pole of the compass deflect (N)clockwise/anticlockwise
fig1	Direction of current B to A	Anticlockwise
fig2	Direction of current A to B	Clockwise

b. from B to A

Activity 2.

a. A to B

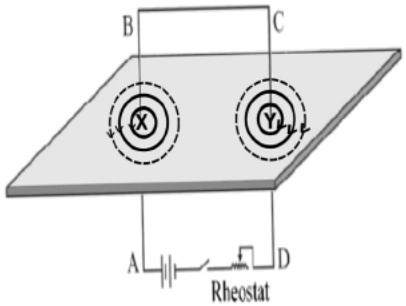
b. Magnetic needle deflects, A magnetic field is developed around a current carrying conductor. Due to the mutual action of the magnetic field of the current carrying conductor and magnetic needle it gets deflected.

c. West

d. Right hand thumb rule

e. By reversing the connection of the battery

f. When intensity of current increases the deflection of magnetic needle also increases.



Activity 3

a.

b. Right hand thumb rule

c. At X is anticlockwise direction and at Y clock wise direction. At X current flows in the upward direction and at Y in the downward direction.

d. A circular magnetic field is produced and direction of magnetic field depends on the direction of current

e. Imagine you are holding a current carrying conductor with the right hand in such a way that the thumb points in the direction of the current The direction in which the other fingers encircle the conductor gives the direction of the magnetic field, Right hand screw rule.

Activity 4

a. Positive

b. Towards west/ anticlockwise

c. Into the coil

d. Right hand thumb rule/ Right hand screw rule

e. Imagine you are holding a current carrying conductor with the right hand in such a way that the thumb points in the direction of the current The direction in which the other fingers encircle the conductor gives the direction of the magnetic field, Right hand screw rule.

f. The mutual action between the magnetic field of the magnetic needle and the magnetic field of the conductor

g. Increase the number of turns . Increase the current

h. south

Activity 5

a. North

b. No, When the current is reversed the polarity also changes and end A becomes south and hence repel

Activity 6

a. Backward

b. Fleming's left hand rule

c. Reverse the direction of magnetic field.

Activity 7

a. A- magnetic field

B - force.

b. Flemings left hand rule : Hold the forefinger, middle finger and the thumb of the left hand in mutually perpendicular direction. If the forefinger indicates the direction of magnetic field and the middle finger indicate the direction of current, then the thumb will indicate the direction of motion of the conductor.

Activity 8

a. N,S - Field magnet
R1,R2 - Split ring
B1,B2, - Brushes
ABCD - Armature

b. anticlockwise

c. B1 contact with R1, B2 contact with R2

d. B1 contact with R2, B2 contact with R1

e. If the rotation of the armature is to be sustained the direction of current through the armature should continuously keep on changing. The split rings help to change the direction of current through the coil after every half rotation.

Activity 9

a. Loudspeaker

b. Electrical energy to sound energy.

c. Motor principle

d. A- diaphragm

B- field magnet.

Activity 10

a. Strengthens electrical pulses reaches from the amplifier.

b. Sent through the voice coil of a loudspeaker.

c. The voice coil, moves to and fro rapidly, in accordance with the electrical pulses

d. These movements make the diaphragm vibrate,

e. Thereby reproduces sound.

Unit test

1. Name two devices that make use of magnetic effect of current.
2. According to Maxwells right hand thumb rule what does the encircled fingers represent?

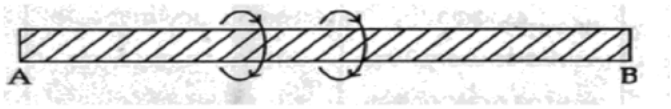
a. magnetic field

b. deflection of magnetic needle

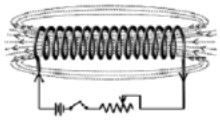
c. intensity of current

d. All the above

3. Write down the energy change taking place in electric motor
   a. mechanical energy → electrical energy
   b. electrical energy → mechanical energy
   c. kinetic energy → potential energy
   d. electrical energy → potential energy
4. Name a device that can convert electrical energy to mechanical energy.
5. The direction of Magnetic field produced when current flows through a conductor AB is given in Fig. Write the direction of current in the conductor according to Maxwell's right-hand screw rule

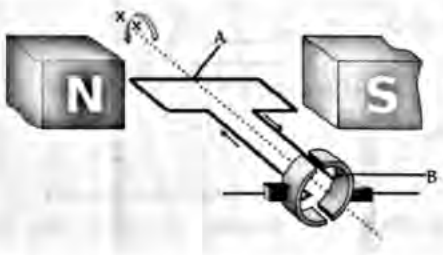


6. classify the given facts and complete the table.

	A	B
		
1.		
2.		
3.		
4		

a .Magnetic field is temporary
b. Magnetic field cannot be changed
c. Polarity can be changed
d. Magnetic field is permanent
e. solenoid
f. bar magnet
g. Magnetic field can be changed
h. Polarity cannot be change

7. Given below is the structural diagram of an electric motor

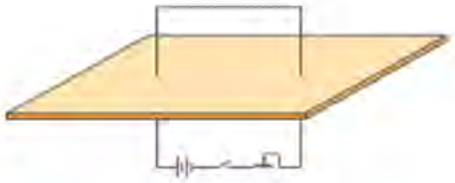


a. Write down the names of part marked as A&B

b. Write down the working principle of this device

c. What is the use of split ring commutator

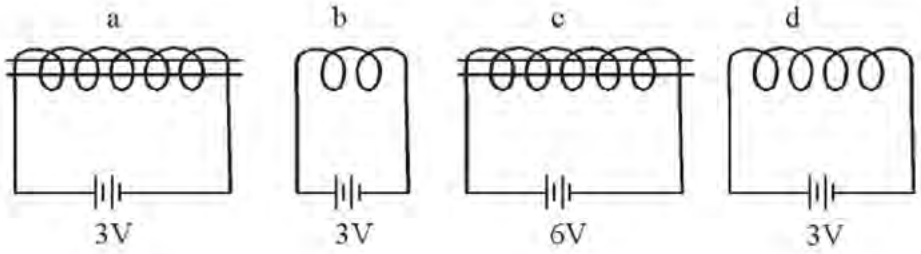
8. Some iron powder is sprinkled on the cardboard and current is passed as shown in figure. Gently tap the cardboard What do you observe. complete the figure and answer the following questions.



a. Write down the property of the magnetic field developed.

b. Name the two laws to determine the direction of magnetic field?

9. Four solenoids of different structure is given below



1 Write in descending order of magnetic force produced when electricity is applied ?

1. a>b>c>d, d>c>b>a, b>c>a>d, c>a>d>b

2. Write down the law that helped to reach this conclusion?

Answer key

1. Electric motor, fan
2. Magnetic field
3. electrical energy → mechanical energy
4. electric motor
5. From A to B
6.

Bar magnet	Solenoid
Permanent Magnet	Temporary Magnet
Polarity cannot be changed	Polarity can be changed
Strength of magnet is the same	Strength of magnet can be varied

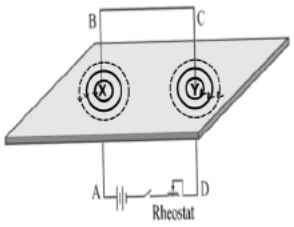
7. a A - Armature

   B – Split ring

   b. Motor principle

   c. If the rotation of the armature is to be sustained the direction of current through the armature should continuously keep on changing. The split rings help to change the direction of current through the coil after every half rotation.

8



   a. Magnetic field is developed around the current carrying conductor

   Circular magnetic field is developed around a current carrying conductor

   b. Two laws that is used to find the direction.

   * Maxwells right hand thumb rule &

   * Right hand screw rule

9. a) c>a>d>b

   b) Intensity of current, Number of turns, Soft iron core

Unit
03

ELECTRO MAGNETIC INDUCTION

Points to Remember

Equations.

(1) $\frac{Vs}{Vp} = \frac{Ns}{Np}$ (2) $P = V \times I$ (3) $Vp \times Ip = Vs \times Is$

(4) $Vp = Np \times E$ (5) $Vs = Ns \times E$

(5) Energy in kilowatt hour $= \frac{\text{Power in Watt} \times \text{Time in hour}}{1000}$

Definitions

1. Electromagnetic Induction

Whenever there is a change in the magnetic flux linked with a coil, an emf is induced in the coil. This phenomenon is elecrtomagnetic induction.

2. Fleming's right hand rule

Imagine a conductor moving perpendicular to a magnetic field. Stretch the forefinger, middle finger and the thumb of the right handin mutually perpendicular directions. If the fore finger represents the direction of the magnetic field, and the thumb represents the direction of motion of the conductor,then, the middle finger represents the direction of the induced current.

3. Mutual Induction.

Consider two coils of wire kept side by side. When the strength or direction of the current in one coil changes, the magnetic flux around it changes. As a result, an emf is induced in the secondary coil. This phenomenon is the mutual induction.

4. Self induction

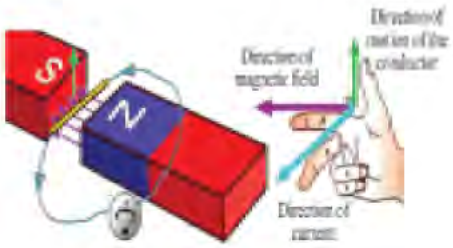
The change in magnetic flux due to the flow of an AC in a solenoid will generate a back emf in the same solenoid in a direction opposite to that applied to it. This phenomenon is known as the self induction.

5. Inductor

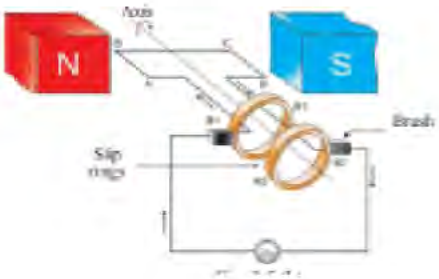
Inductors are coils used to oppose the changes in electric current in a circuit.

Figures

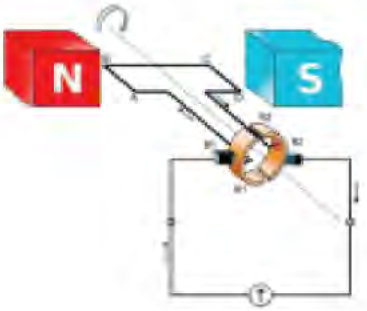
1. Fleming's right hand rule .



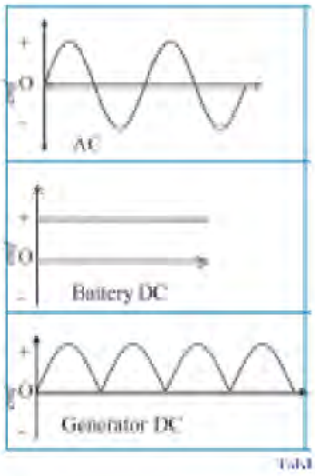
2. AC generator .



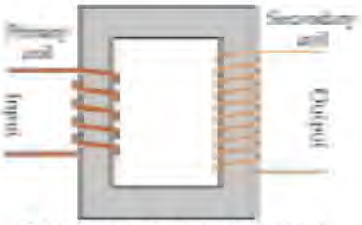
3. DC generator .



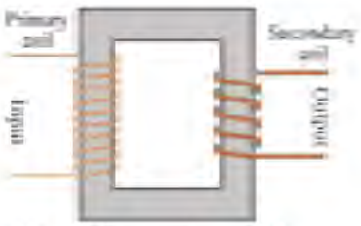
4. Graphic representation.



5. Transformer.

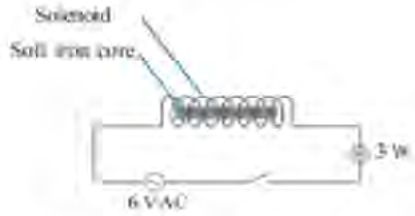


Step up transformer

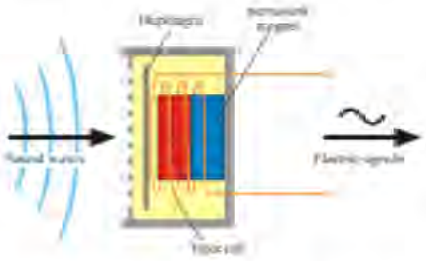


Step down transformer

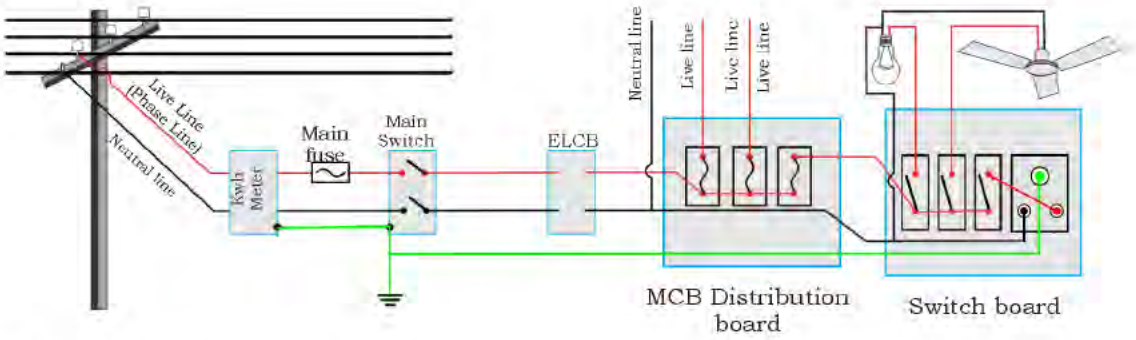
6. Self induction/Inductor



7. Moving coil microphone



8. Household Electrification



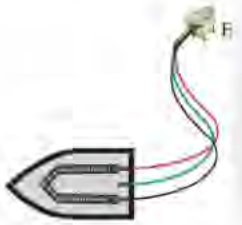
Work sheet

1. Find out the relation of the first pair and complete the second pair.
   Transformer : Mutual induction
   Moving coil microphone : .....

2. Match the following.

Device	Working principle /Law
i. Generator	(a) Self induction
ii. Transformer	(b) Electro magnetic induction
iii. Moving coil microphone	(c) Fleming's right hand.
iv. Inductor	(d) Mutual induction

3. Obsreve the figure.



a. Which line comes into contact with the pin E ?

b. Write two differences of earth pin from the others pins ?

c. How does the there pin plug ensures safty ?

4. Electric shock often leads to death itself. Hence electricity is to be handled atmost concern for safety.

a. Write the situations of electric shock occures.

b. Write some precautions to be taken to avoid electric shock.

c. Write some first aids to be given in the cause of electric shock.

5. .....is a device that is used in the place of a fuse in a branch circuit.

(ELCB,MCB,RCCB)

6. The electric line reaching our home connected first to the watt hour meter.

a. In which line are the fuses connected ?

(phase,neutral,earth)

b. How are the house hold devices connected ?

(series/parallel)

c. What are the colours used for wires in phase, neutral and earth line ?

d. What is the potential difference between one phase line and neutral line.

(400 V , 230 V, 0 V)

8. When electricity is transmitted to distant places there is loss of energy in the conductors in the form of heat . This is known as transmission loss.

a. What is the major method to reduce the heat generated ?

b. In India electricity is produced at .....

(230 V, 400 V , 11000 V)

c. Which transformes is giving electricity for house hold purposes ?

d. Which type of transformer is there in the powe station ?

e. Which type of transformer is there in a substation ?

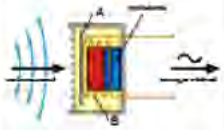
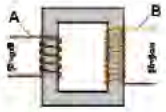
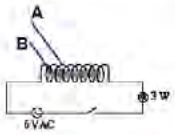
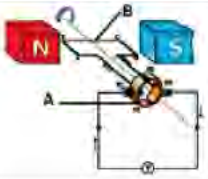
f. The frequency of current generated for distribution in our country is

.....

g. What is the potential difference between two phase lines in a distribution lines ?

(400 V, 230 V, 0 V)

9. Complete the table

No.	Device	Name of the device	Working Principle	Name of part A	Name of Part B
1.		a.....	e.....	Diaphragm	m.....
2.		AC generator	f.....	i.....	n.....
3.		b.....	Mutual Induction	j.....	o.....
4.		c.....	g.....	k.....	p.....
5.		d.....	h.....	l.....	Armature

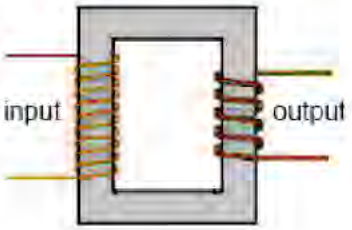
10. Complete the table.

Sl No.	Name of the device	Energy change
1.	Generator	a.....
2.	Moving coil microphone	b.....

11. Match the following.

A	B
a. Electricity obtained from DC generator	x. emf having no variation in the same direction
b. Electricity obtained from AC generator	y. emf having variation in the same direction.
c. Electricity obtained from battery	z. emf having variation and the direction changes continously

12. Observe the figure.



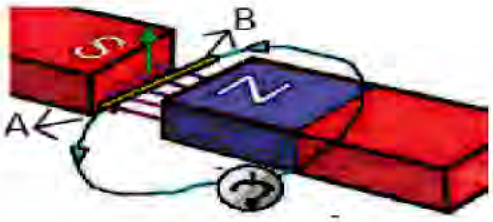
a. Which type of transformer is this (step up /step down)

b. What is the secondary power of this transformer, if the primary power of is 100 W ?

c. The input voltage of a transformer is 12 V AC. There are 10 turns in the primary coil and 5 turns in the sercondary coil What is the out put voltage of the transformer ?

d. Draw the symbol of a transformer?

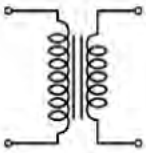
13. Observe the figure.



a. What is the direction of current flowing through the conductor ? (A to B / B to A)

b. Write three factors that helps to increase the amount of current pro duced in the circuit

14. Complete the table

Symbol of the device	Name of the device
a. 	i Transformer .
b.	ii Inductor
c. 	iii .....

Worksheet - Answerkey

1. Electromagnetic induction
2. i→c, ii→d, iii→b, iv→a
3. a. Earth Line

   b. Length andthickness are greates than the rest.

   c. The pin E ofthe three pin plub comes into contact with the earth line. This pin is now connected to the body of theappliance.If at all the body of the comes into contact with an electric connection, electricity flows to the earth through the earth wire.

4. a. When we touch bare wires or cable with damaged insulation or when

lighting strickes or when operate switches with wet hands or doing maintanance work in electric circuits without having sufficient precansions or touching electric lines with metalic substances.

b. Do not operate electric devices with wet hand. Insert plug pius into socket and withdraw them only after switching off. Do not fly kites ear electric lines. Use rubber footware while operatic electric devices.

c. Raise the temperature of the body by massaging.

Give artificial respiration.

Massage the muscles and bring them to the original condition.

Apply pressure on the chest regularly for the functioning of the heart.

5. MCB

6. $\frac{100x10}{1000}$ = 1 Unit

7. a. Phase,

b. Parallel

c. Phase → Red, Neutral → Black, Earth → Green

d. 230 V

8. a. Increase the voltage to reduce current.

b. 11000 V

c. Distribution transformer.

d. Step up

e. Stepdown

f. 50 Hz

e. 400 V

9. a. Moving coil microphone

b. Stepuptransformer.

c. Electromagnetic Induction

d. DC Generator

e. Electromagnetic Induction

f. Electromanetic Induction

g. Self Induction.

h. Electromagnetic Induction

i. Armeture

j. Primary coil

k. Solenoid

l. Splitring

m. Voicecoil

n. Slipring

o. Secondary coil

p. Softironcore

10. a. Mechanical energy Electrical Energy

b. Mechanical energy Electrical Energy.

11. i. b,z.

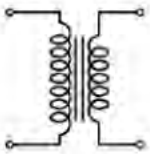
ii. c,x

iii. a,y

12. a. Stepdown,

b. 100 W

c. $\frac{Vs}{Vp} - \frac{Ns}{Np}$, $Vs = \frac{Ns}{Np} \times Vp = \frac{5}{10} \times 12 = 6\ V$

d. 

13. a. B to A

b. Magnet/Solenoid moves with greater speed By using strong magnet.

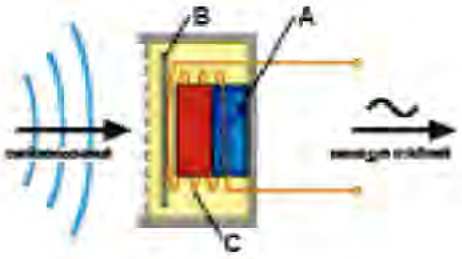
By increasing number of turns of the solenoid.

14. b. 

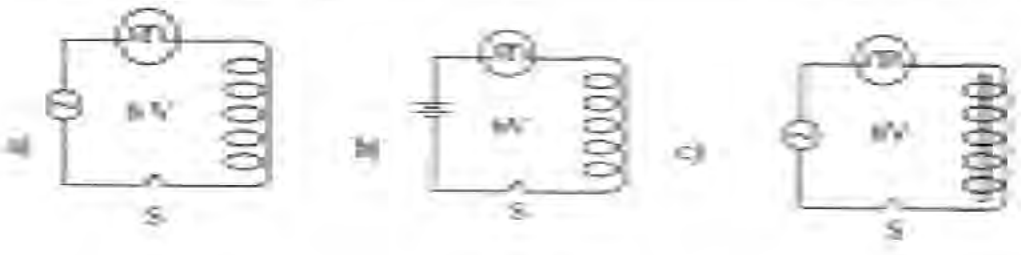
c. Earthing

SAMPLE QUESTIONS

1. Indentify the correct statement from the given.
   a. If a person standing on the earth touches a neutral line, gets an electric shock.
   b. Phase line is earthed
   c. If a person standing on the earth touches a phase line gets an electric shock
2. The commercial unit of electrical energy is _____
3. Write two advantages of connecting devices in parallel in a house hold electrical circuit.
4. The most usefule energy form is electrical energy.
   a. Write any two precautions to be taken to avoid electric shock?
   b. Write any two first aids which are to be given to a person who gets and electric shock?
5. Observe the figure



   a. Write the names of parts A, B, C
   b. What is the working principle of this device?
   c. Write the energy change in this device?
6. Given are the pictures of experiments done by a student using insulated copper wire.



   a. The bulb in which circuit glows with least intensity of light?

b, Which phenomenon cases the decrease in intensity of light in the bulb.

7. Differentiate the statements given below suitable to the stepup and stepdown transformers.

a. Numbers of turns in primary coil is lesser than that of secondary coil.

b. Numbers of turns in primary coil is greater than that of secondary coil.

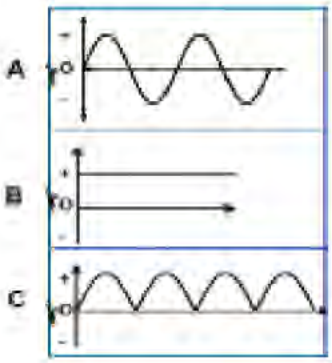
c. Input voltage is greater than output voltage.

d. Output voltage is greater than input voltage.

e. Thickness of primary coil is greater than that of secondary coil.

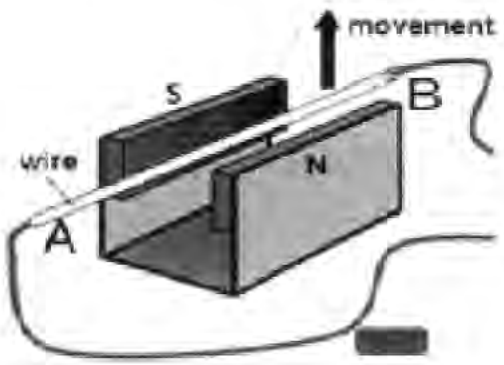
f. Thickness of secondary coil is greater than that of primary coil.

8. Which graph indicates the current produced from a DC generator.



9. The input voltage of a transformer is 240 V AC. There are 100 turns in the secondary coil and 4800 turns in the primary. What is the output voltage of the transformer?

10. Observe the figure

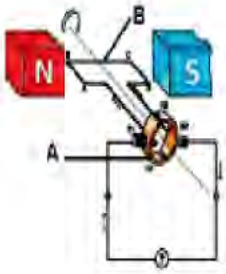


a. What is the direction of current flowing though the conductor

(A to B/B to A)

b. Which rule helps you to findout your answer.

11. Observe the figure.



a. Indentify the device shown in the figure?

b. What is the working principle of this device?

c. What energy change takes place in this device?

12. Two electric fans of power 65 W works for 2 hours. Calculate the energy consumed?

13. Oberve the figure

Electric current is produced in the circuit when an experiment is setup as shown in figure.

a. Write three factors influencing to increase the phenomenon behind the flow of current in the circuit.

b. Name the phenomenon behind the flow of current in the circuit.

14. What does the below shown symbol indicates?

Sample Questions - Answerkey

1. C
2. kWh/Kilowatt hour
3. Devices work according to the marked power.
   Devices can be controlled using switches as per need.
4. a. Never handle electric equipments when the hands are wet.
   b. Do not fly kites near electric lines.
5. a. A - Fieldmagnet
      B- Diaphram
      C- Voice Coil
   b. Electromagnetic Induction
   c. Mechanicalk energy $\longrightarrow$ Electrical energy
6. a. C
   b. Self Induction
7. Stepup $\longrightarrow$ a, d, e
   Stepdown $\longrightarrow$ b, c, f
8. C
9. Vp = 240 V, Np = 4800, Ns = 100, Vs = ?

$$Vs = Vp \times \frac{Ns}{Np} = \frac{240 \times 100}{4800} = 5\ V$$

10. a. B to A
    b. Fleming's Right hand rule
11. a. DC generator
    b. Electronagnetic Induction
    c. Mechanical energy $\longrightarrow$ Electrical engery
    d. A - Splitring
       B - Armetme
12. Energy in kilowatt hour = $\frac{\text{Power in watt} \times \text{time inhour}}{1000}$
13. a. By increasing number of turns.
       By using stronger magnets
       Magnet moves with greater speed.
    b. Electromagnetic Induction
14. Inductor

Unit
04

REFLECTION OF LIGHT

Points to Remember

- **Laws Of Reflection**

  When light is reflected from a smooth surface,the angle of incidence and angle of reflection are equal.

  The incident ray, reflected ray and normal to the surface are in the same plane.

- **Regular Reflection**

  When light ray falls on the smooth surface, it undergoes regular reflection. After regular reflection light rays travel parallel.

- **Irregular Reflection**

  When light falls on a rough surface ,it undergoes an irregular reflection.

- **Scattering**

  In the dust particles of the atmosphere,light undergoes scattered reflection.This is scattering.

- **Field of View**

  Field of view of a mirror is the maximum range of vision through the mirror.

- **Magnification**

  Magnification is the ratio of height of the image to the height of the object.

Features of image formed by plane mirror

Size of the image is equal to the size of the object.

Virtual and erect Image.

Object distance is equal to Image distance

Important Equations

Number of images(n)=$(360/\theta)-1$

θ-angle between mirrors.

$1/f = 1/u + 1/v$, $f = (uv)/(u+v)$

u-Object distance.

v- Image distance.

F- Focal length.

Magnification(m)=hi/ho

hi - height of image

ho - height of object

m=-v/u

Magnification = 1,Size of the image =Size of theoject

Magnification > 1,Size of the image >Size of theoject

Magnification < 1,Size of the image <Size of theoject

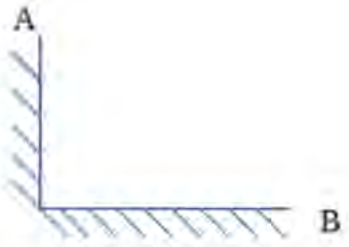
WORK SHEET

1. Find out the relation of the first pair and complete the second pair

   Used in solar Furnace :: Concave Mirror

   ..... :: Convex Mirror

2. Plane mirrors A and B are arranged as shown in figure.



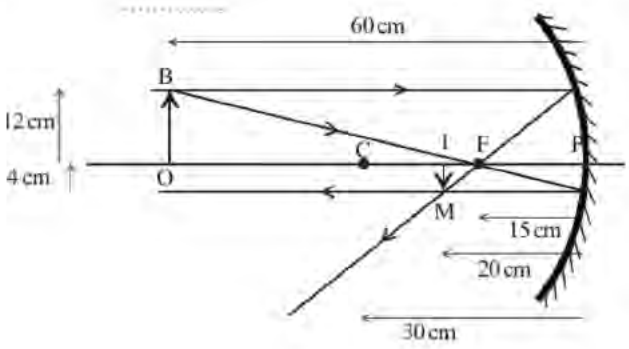
   a) What is the angle between the mirrors?

   b) Calculate the number of images formed between them.

   c) How many images are formed if the angle between the mirrors is 60°?

   d) Write any two characteristics of the image formed by a plane mirror.

3. Observe the figure and Complete the table.



Distance of object from the mirror, (u)	-60 cm
Distance of image from the mirror, (v)	
Focal length (f)	
Radius of curvature (r)	-30 cm
Height of object (OB)	+12 cm
Height of image (IM)	

4. When an object is placed 15 cm in front of a concave mirror, its image is formed on the screen at a distance of 10 cm from the mirror. Find the focal length of the mirror.
5. Image of an object in front of a spherical mirror of focal length 20 cm gets a magnification of -1.
   a) What type of mirror is this?
   b) Write any two characteristics of image.
   c) Write two uses of this mirror.
6. Which is correct about a convex mirror ?
   [Magnification=1,Magnification>1,Magnification<1]
7. Write the correct statements about plane mirror from the box

Object distance is equal to Image distance.
Always formed virtual image.
Always formed real image.
Size of the image is equal to size of the object
Image size is greater than object size

8. Which of the following is not likely to be the magnification of a concave mirror?
   [+1,-1,+2,-2]

9. Arrange A,B,C columns suitably.

A	B	C
Plane Mirror	The image is diminished virtual and erect.	Rear view mirror in vehicle
Concave Mirror	The image is virtual,erect and is of the same size as that of the object	For observing face
Convex Mirror	Object placed between principal focus and pole, the images formed are enlarged and erect.	Doctors use it as a head mirror.

ANSWER KEY

1.Rearview mirror in vehicle.

2. a) 90°
   b) 3
   c) 5
   d) Image distance is equal to object distance
   Virtual image

3. v = -20 cm
   f = -15 cm
   IM = -4 cm

4. u = -15 cm
   v = -10 cm
   f = uv/u+v
   = -15x-10/-15+-10
   = 150/-25
   = -6 cm

5.a) concave mirror
   b) real,inverted
   c) Shaving mirror,film projector

6. Magnification<1

7. a,b,d

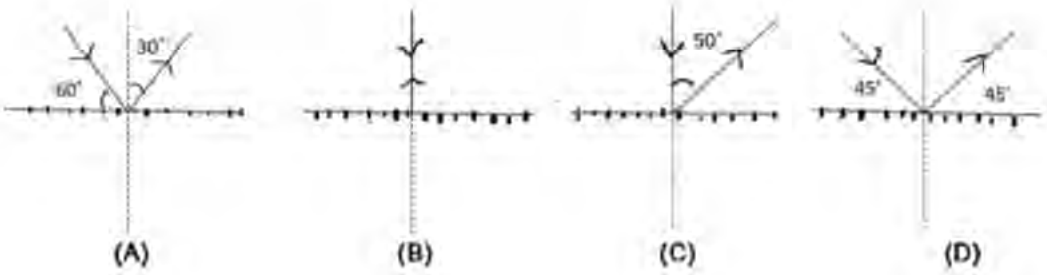
8. +1

9.

A	B	C
Plane Mirror	The image is virtual,erect and is of the same size as that of the object	For observing face
Concave Mirror	Object placed between principal focus and pole, the images formed are enlarged and erect.	Doctors use it as a head mirror.
Convex Mirror	The image is diminished virtual and erect	Rear view mirror in vehicle

SAMPLE QUESTIONS

1. The images associated with the reflection that occurs in a plane mirror are given below.Which is wrong?



2. The magnification of the image formed by a concave mirror is -1
   a) What will be the position of the object?
   b) What will be the position of the image?
   c) Write any two charecteristics of the image.

3.Identify the figure which represent concave mirror and convex mirror

4.Complete the table given below

Mirror	Situations used
Plane Mirror	.....(a).....
Concave Mirror	.....(b).....
Convex Mirror	.....(c).....

5. An object is placed in front of a concave mirror of focal length 12 cm at a distance 30 cm from the mirror.Find the position and nature of the image.
6. Imagine that a spherical mirror gives a real image of size 6 times that of the object at a distance 6 m from the mirror.If so determine whether the mirror is concave or convex.How much will be the focal length of the mirror?
7 Two plane mirrors are arranged at an angle of 45° and a point object is placed between them. How many images of the object can be seen?
8. Find out the relation of the first pair and complete the second pair.

   Magnification= 1 :: Size of the object is equal to size of the image

   Magnification < 1 :: .....
9. A mirror always form diminished virtual image of an object.

   a) Which type of mirror is this?

   b) Write any two uses of this mirror?
10. Write the relation of angle between two plane mirrors and number of images.

ANSWER KEY

1. c
2. a) At c

   b) At c

   c) real, inverted
3. b - concave mirror

   c, d - convex mirror
4. a - for observing face

   b - shaving mirror

   c - rear view mirror in vehicle
5. v= (-12 × 30)/30+(-12)

   =-20 cm

   real ,inverted,diminished image

6. concave mirror

   m = -6

   -6 = - (-6/u)

   u = -1m

   f = -1×-6/-1+-6

   = -0.85m

7. 7images

8. Size of the image is less than size of the object

9. a) Convex mirror

   b) Rearview mirror in vehicle.

   Reflectors in street light

10. Number of images (n) = $(360/\theta)$-1

Unit
05

REFRACTION OF LIGHT

Points to Remember

Unit at a glance

Optical density is a measure that shows how a medium influences the speed of light passing through it.

When a ray of light entering obliquely from one transparent medium to another, its path undergoes a deviation at the surface of separation. This is refraction.

Laws of Refraction

The angle of incidence, the angle of refraction and the normal at the point of incidence on the surface of separation of the two media will always be in the same plane.

Snell's Law.

The ratio of the sine of the angle of incidence to the sine of the angle of refraction (sin i/sin r) will always be a constant.

The constant from Snell's Law is known as refractive index. This is

indicated by the letter n.

The refractive index of one medium with respect to another is called Relative refractive index

The refractive index of a medium with respect to vacuum is called absolute refractive index.

When a ray of light passes from a medium of greater optical density to that of lower optical density, the angle of incidence at which the angle of refraction becomes 90^0 is the critical angle.

The critical angle in water is 48.6^0

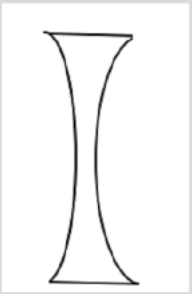
When a ray of light passes from a medium of higher optical density to a medium of lower optical density at an angle of incidence greater than the critical angle, the ray is reflected back to the same medium without undergoing refraction. This phenomenon is known as total internal reflection.

Lens

A lens is a trasparent medium having spherical surfaces

Two Types of lense

Convex concave



Principal focus of a convex lens

Light rays incident parallel and close to the principal axis after refraction converges to a point on the principal axis of a convex lens. This point is the principal focus of a convex lens.

Principal focus of a concave lens

Light rays incident parallel and close to the principal axis diverge from one another after refraction. These rays appear to originate from a point on the same side. This point is the principal focus of a concave lens.

Focal length

Focal length is the distance from the optic centre to the principal focus.

This is denoted by the letter f'.

New cartesian sign convention

Convex lens	Concave lens
f....positive	f.....Negative
v..positive for real images , Negative for virtual images	v...Negative
u..negative	u...negative

Lens Equation

$1/f = 1/v - 1/u$

Or

$f = uv/u-v$

Magnification

Magnification is the ratio of height of the image to height of the object.

It shows how many times the image is larger than the object .

Magnification(m) = hi/ho

Or

$m = v/u$

If magnification is negative,the image will be real and inverted. An erect and virtual image indicates that the magnification is positive. Power of a lens is the resiprocal of focal length expressed in metres.

$P = 1/f$

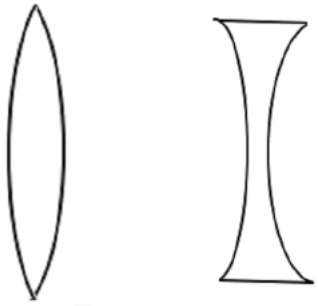
Unit of power is dioptre and it is represented by D.

Activities

1. Phenomenon make use in optical fiber cable is

   (Dispersin , Total internal reflection , Refraction)

2. Observe the figure.



   a. Identify the lenses shown in the figure.

   b. Which of the above lens always produces diminished virtual images.

   c. Which lens produces images which has the same size as that of the object.

3. Refractive index of some materials are tabulated

Material	Refractive index
glass	1,52
glicerine	1.47
Sun flower oil	1.47
water	1.33
Flint glass	1.62

   a. Through which material light travells with greater speed.

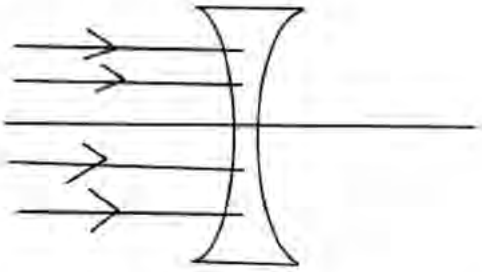
   b. What is the relation between refractive index and speed of light .

4. Observe the figure

a. Name the phenomenon responsible for the ray of light coming after reflection from the pencil undergoes deviation.

b. Define this phenomenon.

5. Complete the figure and mark the principal focus of the lens.



6. Some technical terms related to lenses are given below.using this fill the missing part of the following questions suitabily .

a. Centre of a lens is .....

b. The distance between optic centre and principal focus .....

c. Center of the spheres of which the sides lens forms a part is .....

d. Imaginary line passing through the two centres of curvatures.

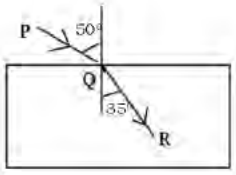
7. A lighted candle is placed in front of a convex lens and an image is formed on the screen . Identify the position of the object in the following situations.

a. Size of the object is same as that of the object

b. Magnified virtual image

c. Magnified real image.

8. Observe the figure



a. Identify the incident ray

b. Identify the refracted ray

c. What is the angle of incidence

d. What is the angle of refraction

e. What happens to the path of the light ray enters obliqly from air to glass.

9. some of the media of light are given below.Which one has lowest optical density.

Vacuum , Diamond ,water , Glass

10. The power of a lens in a spectacle used by a person is -2.5 D

a. What type of lens is this ?

b. What do you mean by the power of a lens?

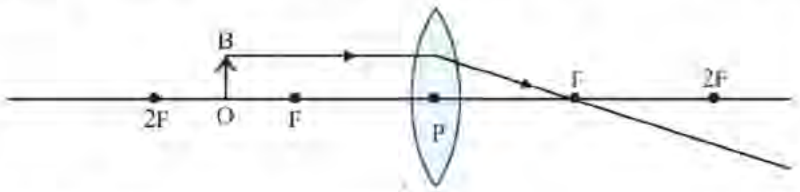
c. Find out the focul length of this lens?

11. Match the following

Magnification 1	Real image
Magnification always less than 1	Virtual image
Magnification positive	Convex lens
Magnification negative	Concave lens

12. Write any two practical application of total internal reflection.

13. Figure given below shows an object OB placed in front of a convex lens



a. Complete the ray diagram

b. Where is the position of the object

c. Write any two features of the image formed

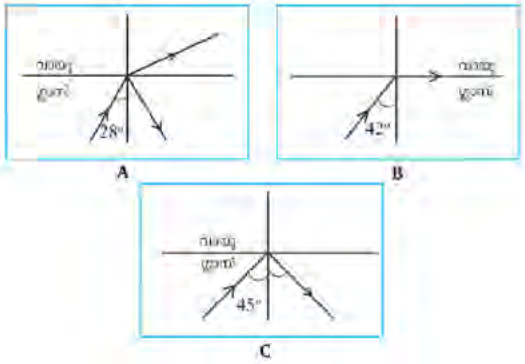
14. When an object is placed 15 cm away from a convex lens an image is formed at a distance of 30 cm.

a. What is the focal length of this lens?

b. Find out the magnification of the image formed.

c. What is the power of this lens ?

15. Path of the light through different media are depicted below.Observe the figure and answer the following questions.

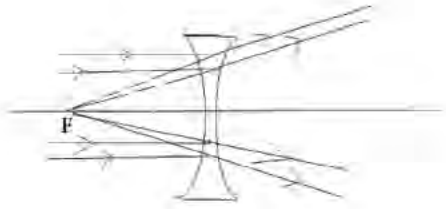


a. What is the critical angle of glass?

b. Which figure shows total internal reflection.

c. What are the condition for the occurrence of total internal reflection.

Answer key

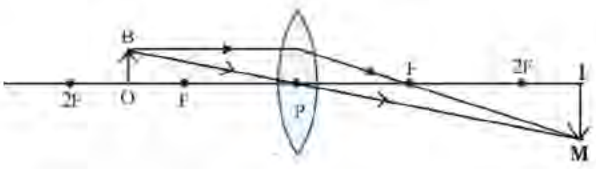
1. Total internal reflection
2. a. convex , concave
   b. Concave
   c. Convex
3. a. Water
   b. If refractive increases speed of light decreases
4. a. Refraction
   b. Correct defenition
5. 

6. a. Optic centre
   b. Focal length
   c. Centre of curvature
   d. Principal axis

7. a. 2F
   b. Between F & P
   c. Between F & 2F
8. a. PQ
   b. QR
   c. 50°
   d. 35°
   e. Refraction
9. a. Water
10. a. Concave lens
    b. Definition of power
    c. p=1/f
       f=1/p =1/1.25=0.8 m=80 cm
11.

Magnification 1	Convex lens
Magnification always less than 1	Concave lens
Magnification positive	Virtual image
Magnification negative	Real image

12. a. Optical fibre , Endoscope
13. a.



    b. Beyond 2F
    c. Magnified image, inverted and real
14. a. f = uv/u-v= -15×30/ -45 =10 cm
    b. p = 1/f = 1/10/100=100/10=10 D
    c. m = v/u=30/-15 = -2
15. a. 42°
    b. C
    c. Light must travel from a medium having higher optical density to lower optical density. Angle of incidence must be greater than critical angle

Sample Questions

1. if a convex lens forms a diminished real image what will be the position of the object.

   a. At 2F b. Beyond 2F

   c.Between F & 2F d. At F

2. When a ray of light incident obliquely from one medium to another medium of higher optical density.

   a. Deviate towards the normal

   b. Deviate away from the normal

   c. Passess without any deviation

3. If the magnification is negative

   a. Image will be virtual & erect

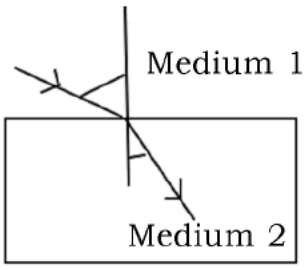
   b. Image will be real & inverted

   c. Image will be virtual & inverted

   d. Image will be real & erect

4. power of a lens (P) =.....

5. Observe the figure



   a. Which one among the above medium has lowest speed of light ?

   b. Which one among the above medium has highest speed of light ?

   c. On what basis you reached the above answers.

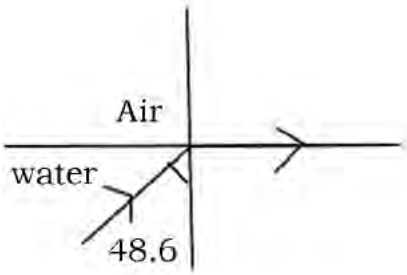
6. Magnification of a lens is -1

   a. What do you mean by magnification?

   b. What is the significance of negative sign.

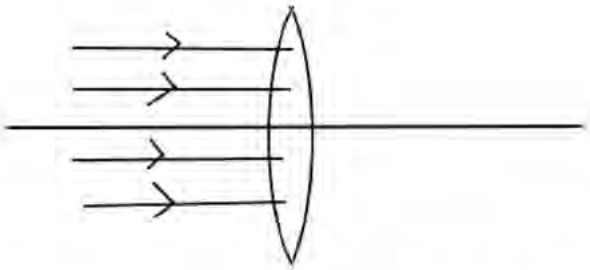
   c. Which type of lens is this?

7. Critical angle of water with respect to air is 48.60



a. What do you mean by critical angle ?

b. If the angle of incidence is increased again what happened to the light ray.

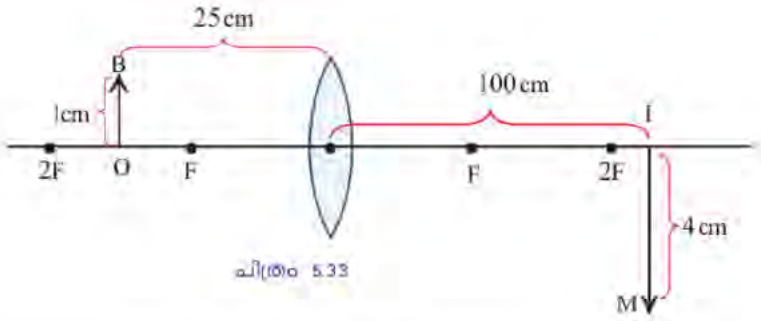


a. Which type of lens is shown in figure .

b. Complete the figure and mark the principal focus of the lens.

c. How many principal focus does this lens have.

9. Write the measurements shown in figure on the basis of new cartesian sign convention.



a. Distance from lens to object u=.....

b. Distance from lens to image v=.....

c. Height of the object (OB) =.....

d. Height of the image (IM) =.....

10. Explain the reason for the twinkling of stars .

11. Identify the relation and fill suitabily

a. Mirror :.pole

b. lens :.....

12. The focal length of a concave lens is 40 cm. When an object is placed before this lens an image is formed at a distance of 24 cm. If so calculate the distance to the object?

13. Information related to the image formation of a convex lens is given in the table. Mach them suitably.

1	Object in between F and lens	a	Image at 2F on the other side	d	Image has same size of the objecrt
2	Object at F	b	Image formed on the same side of the object	e	Magnified virtual image
3	Object at 2F	c	Image at infinity	f	Magnified real image

Answer key

1. b
2. a
3. b
4. 1/f
5. a. medium 1

   b. medium 2

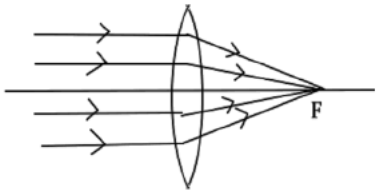
   c. When light ray enters to a optically denser medium it deviate towards the normal.when optical density increases speed of light decreases .
6. a. Magnification is the ratio of the height of the image to the height of the object .

   b. image is real and inverted.

   c. Convex
7. a. correct definition of critical angle.

   b. Total internal reflection

8 a. convex



c.2

9. a.U = -25 cm

   b V= 100 cm

   c OB =1 cm

   d IM = - 4 cm

10 Atmospheric Refraction

11. optic centre

12. f = -40 cm

    v = -24 cm u =vf/v+f = -15 cm

13. 1-b-e , 2-c-f ,3-a-d

Unit
06

VISION AND THE WORLD OF COLOURS

Points to Remember

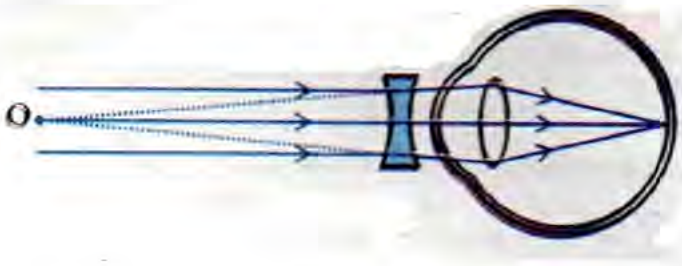
- **Near Point :** The nearest point at which the objects can be seen distinctly. The near point of an eye with healthy vision is 25 cm.
- **Far point :** The farthest point at which the object can be seen distinctly. The far point of an eye with healthy vision is at infinity.
- **Persistence of vision :** Image remains in the retina of the eye for a time interval of $\frac{1}{16}$ sec after seeing it.
- **Long-sightedness (Hypermetropia) :** Nearer object cannot be seen clearly but distant objects can be seen clearly. Long sightness can be rectified by using a convex lens of suitable power.
- **Near-sightedness :** Nearer object can be seen clearly but distant objects cannot be seen clearly. Near sightedness can be rectified by using a concave lens of suitable power.
- **Presbyopia :** The condition of reducing power of accommodation due to the diminishing ability of the ciliary muscles. Presbyopia can be rectified by using a convex lens of suitable power.
- **Dispersion of light :** Splitting up of composite light into its constituent colours.
- **Composite light :** Any light that is composed of more than one colour is a composite light.
- **Dispersion :** It is the phenomenon of splitting up of a composite light in to its constituent colours.
- **Scattering of light :** Change in direction brought out by the irregular and partial reflection of light.
- **Rate of scattering :** As wavelength increases rate of scattering decreases.
- **Tyndal effect :** When a ray of light pass through a colloidal fluid or suspension, the tiny particles got illuminated due to scattering.
- **Visible spectrum in the ascending order of their wavelength :** VIBGYOR

Characteristics	High	Low
Wavelength	Red	Violet
Rate of scattering	Violet	Red

Defect of eye	Reason for the Defect	Remedy
Long sightedness	• Smaller size of the eye ball • Low power of eye lens	Convex lens of suitable power
Near sightedness	• Larger size of the eye ball • High power of eye lens	Concave lens of suitable power
Presbyopia	• Diminishing ability of ciliary muscles	Convex lens of suitable power.

Activities

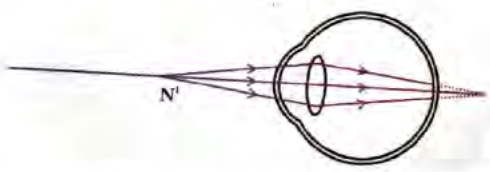
1. Observe the diagram



   a. Which defect of eye is rectified by using a concave lens of suitable power?

   b. What may be the reason behind this defect?

2. The following figure shows the image formed by a defective eye.



   a) Which defect of eye is represented by the figure?

   b) What is the reason for this defect?

   c) Which type of lens is used to rectify the above defect of eye?

3. The doctor has written '-2D' in his prescription

   a) What has the doctor indicated in the prescription?

   b) What does the letter 'D' stands for?

c) Which type of lens is referred as '-2D'?

d) Which type of lens is used, if '+2D' is mentioned

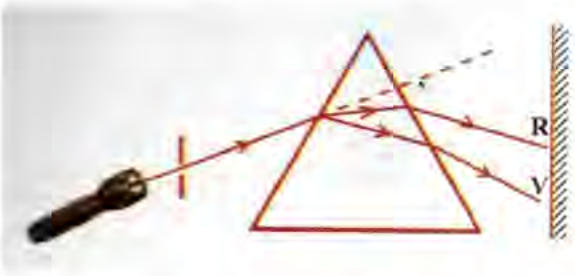
4. For elderly people the distance to the near point is greater than 25 cm.

c) Name the defect of eye?

d) What is the reason for this defect?

e) What is the distance to the near point of the human eye with normal vision?

5. Pass white light through a prism and allow it to fall on a screen.



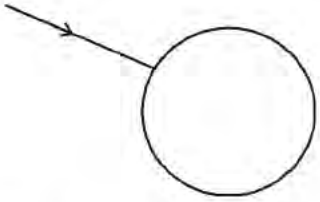
a) Write the name of the regular array of colours formed on the screen?

b) Which colour has the highest wave length?

c) Which colour deviates more?

d) Whether the wavelength is more or less for more deviated colour?

6. The following figure represents, sunlight passes through the water droplet in the atmosphere. Sunlight



a) Complete the diagram?

b) What happens to the sunlight, when it passes through the water droplet?

c) Give a situation for the above phenomenon from nature?

d) Which colour can be seen in its outer region?

e) Which colour can be seen in its inner region?

f) Watching from an aeroplane the rainbow will seen in which shape?

7. Eye donation is one of the noblest donations. Through eye donation, those who have closed their eyes forever can light up other's lives.

a) How many hours after death can eyes be donated?

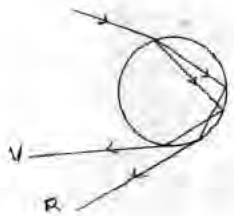
b) Which part of eye of the donor can be donated?

8. Sky is seen in blue colour because of the scattering of sunlight.
   a) Which are the occasions when sunlight has to travel greater distance through the atmosphere before reaching the eyes of an observer on the earth?
   b) When light reaches the observer after travelling long distances through the atmosphere, which colour reaches the eye? What is the reason?

9. We can never imagine a world without light.
   a) What is meant by light pollution?
   b) What are the consequences of light pollution?
   c) Write three methods to prevent light pollution?

Answer key

1. a) Near –sightedness
   b) Larger size of the eyeball
   High power of eye lens
2. a) Long – sightedness
   b) Smaller size of the eye ball
   Low power of eye lens
   c) Convex lens
3. a) Power of lens
   b) Unit of power- Dioptre
   c) Concave lens
   d) Convex lens
4. a) Presbyopia
   b) Diminishing ability of the ciliary muscles
   c) 25 cm
5. a) Visible spectrum
   b) Red
   c) Violet
   d) Less
6. a)



b) Refraction and internal reflection

c) Rainbow

d) Red

e) Circle

7. a) Within 6 hours

b) Cornea

8. a) Morning and evening

b) The red light having more wavelength less amount of scattering only reaches our eyes.

9. a) The use of light in excess in a non- judicious manner is referred to as light pollution

b)

The life cycle of living beings will be affected adversely

Sky watching becomes impossible due to diminished sky vision

The light from tall flats misleads the migrating birds. It affects the accuracy of their judgement of direction.

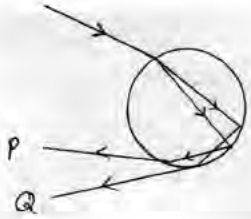
c)

1. Use shades in light sources
2. Restrict usage of light beyond a specific period during night
3. Dim the head lights.
4. Make people aware of light pollution.

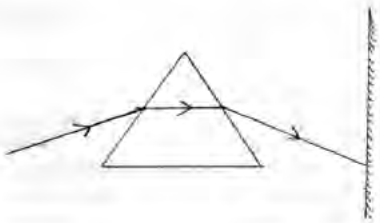
SAMPLE QUESTIONS

1. The distance to the near point from the human eye with normal vision is .....
2. The phenomenon of splitting up of a composite light in to its constituent colour is .....
3. White colour appears when Newton's colour disc is rotated fast. This is due to .....
4. Presbyopia can be rectified using ..... lens of suitable power.
5. Near object cannot be seen clearly even though distant objects can be clearly seen. This defect of eye is called long -sightedness.
   a) Which type of lens is used to rectify this defect of the eye?
   b) Write down the reasons for long-sightedness.
6. When a person suffering from problem in vision, met a doctor, the doctor wrote +1.5D, -2D in his prescription.
   a) What do these writings indicate?
   b) Which are the types of lenses prescribed by the doctor?

7. The path of light can be clearly seen in the foggy morning.
   a) What is this phenomenon known as?
   b) Explain this phenomenon?
8. The following figure indicates the formation of rainbow in a water droplet.



   a) Which are the phenomena that take place for a ray of light when it passes through water droplet?
   b) Which are the colours indicated by P and Q?
9. The path of a laser light through a glass prism is depicted.



   a) Which are the colours formed on the screen when sunlight is allowed to pass through prism?
   b) What is this phenomenon known as?
   c) Which is the colour of least wavelength?
   d) Write down the methods to prevent light pollution?

Answer Key

1. 25 cm
2. Dispersion of light
3. Persistence of vision
4. Convex lens
5. a) Convex lens
   b) Smaller size of the eye ball
   Low power of the eye lens
6. a) Power of the lens
   b) +1.5D convex lens

-2D concave lens

7. a) Tyndal Effect

   b) When rays of light pass through a colloidal fluid or suspension, the tiny particles get illuminated due to scattering.

8. a) Refraction and internal reflection

   b) P-Violet , Q - Red

9. a) VIBGYOR

   b) Dispersion

   c) Violet

   d) 1) Used shades to light sources

   2) Control the use of light during night

   3) Use head light in dim mode, etc.

Unit
07

ENERGY MANAGEMENT

Points to Remember

At a glance

* Different types of energy sources.
* Fuels - Substances that release a lot of heat energy when burned are called fuels.

  Fuels - Solid, liquid , gas

  LNG - Liquified Natural gas

  CNG - Compressed Natural Gas.

  LPG - Liquified Petrolium gas
* Combustion: - Complete Combustion - Complete combustion is when fuels react with oxygen to produce heat and light as well as carbon dioxide and steam.

  Partial Combustion - Combustion with less oxygen results in more carbon monoxide and carbon and less carbon dioxide.
* Fossil fuels - coal, petroleum, natural gas.
* Fuel efficiency - Calorific value.

  The calorific value of a fuel is the amount of energy released when one kilogram of fuel is completely burnt.
* Renewable energy sources - solar energy, wind, marine energy, geothermal energy,

biomass and biogas.

* Solar Energy - Solar Cell, Solar Panel, Solar Thermal Power Plant.
* Nuclear Energy: Nuclear Fission, Nuclear Fusion.
* Green Energy - Energy produced from environmentally friendly sources without causing environmental pollution.
* Brown Energy - Energy produced from non-renewable energy sources. Causes environmental pollution.
* Brown Energy - Energy produced from non-renewable energy sources. Causes environmental pollution.

Activities

1. Substances which release great amount of heat energy on burning are called fuels .

   Arrange the following fuels in the given table.

   Petrol , Firewood,Coal ,Naphtha ,LPG,Coak ,Ammonia, Biogas, Nuclear fuel.

Solid	Liquid	Gas

2. What are the products obtained on the fractional distillation of petroleum?

3. Find out correct relation and fill up the blanks.

   CNG : Compressed natural gas

   LPG : .....

   LNG : .....

4. Coal is classified into four based on the carbon content in the fill in the blanks suitably .

   Peat, ..., Anthracite, ...

5. Write down the reason.

   Hydrogen is not used as a household fuel though it has high calorific value.

6. Match the following suitably .

A	B
LPG carbon methane butane	Carbon
coal	Methane
Biogas	Butane

7. a) write down the condition for the complete combustion

   b) What are the drawbacks of partial combustion.

   c) Which are the instances when hydrogen is used as fuel?

8. Match the following appropriately.

A	B	C
Hydroelectric power station	Nuclear Energy → Electrical Energy	koodamkulam Tharappur
Thermal power station	Potential Energy → Electrical Energy	Moolamattam Pallivasal
Nuclear power station	Chemical Energy → Electrical Energy	Neyveli Kayamkulam

9. Sun is the major source of energy on earth.
   a) List out the instruments that use solar energy directly.
   b) When do plants consume solar energy?
   c) Write the energy conversion in the solar panel?
10. a) Which is the cooking gas that we get in cylinders for domestic use ?
   b) Which is the main component of this gas?
   c) It is marked as C28 in the cylinder. What does it indicate?
11. Classify the energy from the following sources as green energy and brown energy.

   Solar cell, Atomic reactor, Energy from waves, Hydroelectric power, Diesel engine, Wind mill, Thermal power station.
12. a) What is energy crisis
   b) Write down the reasons for energy crisis
   c) Write down the remedies for Energy Crisis.
13. Nuclear energy is the energy obtained from the nucleus.
   a) What are the ways of making energy from nucleus?
   b) What are the activities carried out in nuclear power station?
   c) What is meant by nuclear pollution?
   d) What are the precautions against nuclear disasters?

Answer Key

1.

Solid	Liquid	Gas
Firewood	Petrol	LPG
Coal	Naphtha	Ammonia
Coke		Bio gas
Nuclear fuel.		

2. Ammonia, coal gas, coal tar, coke
3. a) Liquefied petroleum gas
   b) Methane
4. Lignite, bituminous coal.
5. Hydrogen is highly inflammable and explosive in nature therefore it is difficult to transport and store.
6.

A	B
LPG	Butane
Coal	Carbon
Bio gas	Methane

7. a) Sufficient oxygen must be available, The solid fuels must be dry.

   b) Loss of fuel, Formation of carbon monoxide and soot, Atmospheric pollution.

   c) Used in rockets, Hydrogen fuel cell.

8.

A	B	C
Hydroelectric power station	Potential Energy → Electrical Energy	Moolamattam Pallivasal
Thermal power station	Chemical Energy → Electrical Energy	Neyveli Kayamkulam
Nuclear power station	Nuclear Energy → Electrical Energy	koodamkulam Tharappur

9. a) Solar Water Heater, Solar Cooker, Solar Lamps.

   b) For photosynthesis.

   c) Solar energy is converted into electrical energy.

10. a) LPG

    b) Methane

    c) The expiry date of that cylinder is from July to September 2028.

    d) Ethyl mercaptan..

11.

Green Energy	Brown Energy
Solar cell	Atomic reactor
Energy from wave Hydroelectric	Diesel Engine
power station	Thermal power station
Wind mill	

12. a) The energy crisis is an increase in the demand for energy and a decrease in its supply.

    b) Population growth, mechanization, urbanization, Increase in number of vehicles,

    excessive energy consumption in industries etc.

    c) Use renewable energy sources

    Use of fuel efficient machines and vehicles

    Judicial use of fossil fuels.

    Timely and proper maintenance of machines.

13. a Nuclear Fission Nuclear fusion.

    b) In a nuclear reactor, water is converted into high-pressure steam using the heat energy released by nuclear fission, which is used to generate electricity.

c) Nuclear pollution is pollution caused by the presence of nuclear materials and radiation in the air, water and environment.

d) Move to safe places.

Follow the instructions of the authorities exactly.

Observe nuclear radiation warning signs.

SAMPLE QUESTIONS

1. LPG : Butane

   CNG : .....

2. Energy from waves : Green Energy

   Petroleum : .....

3. The main component of coal is .....

4. Write any two properties that a good fuel must have?

5. Write down two devices that can be used at home to reduce energy consumption.

6. Tidal energy is not exploited in Kerala. Why?

7. Nuclear hazards can be natural or artificial. Tabulate the following.

   * Cosmic rays from outer space.
   * The use of radio active isotopes in medical field.
   * Wastes from nuclear rectors.
   * Radiation from radio active materials on earth.

Natural	Man made

8. Hydrogen is not used as a household fuel though it has high calorific value. Write down the reason.

9. It is marked as A25 in a LPG cylinder. What does it indicate?

10. Prepare two posters to convey the message of solving the energy crisis?

Answer key

1. Methane
2. Brown Energy
3. Carbon
4. Any two properties
5. Any two devices
6. The rise in water due to high tide is less than a metre.
7.

Natural	Man made
* Cosmic rays from outer space.	* The use of radio active isotopes in medical field.
* Radiation from radio active materials on earth.	* Wastes from nuclear rectors.

8. Hydrogen is highly inflammable and explosive in nature therefore it is difficult to transport and store.
9. The expiry date of that cylinder is from January to March 2025.
10. Preparing two posters.

ASSESSMENT TOOL Set 1

PHYSICS

Time : 1½ Hours | Total Score : 40

Instructions

- First fifteen minutes is cool off time
- Read the questions and instructions carefully before writing the answers
- While answering the questions , consider score and time

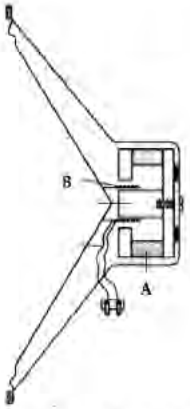
Answer any four questions from 1 to 5. Each carries 1 score. (4 × 1 = 4)

1. Find out the relation in the first pair and complete the second pair
   Electric bulb : Converting electrical energy to light energy
   AC Generator:..... (1)
2. In an LPG cylinder it is marked as 'D23'. What does it indicate. (1)
3. Identify the correct statement from the following . (1)
   a. The least distance of distinct vision for a healthy eye is 20 cm
   b. The cornea of the donor should be harvested within 6 hours of death.
   c. Presbyopia can be overcome using concave lens of suitable power.
   d. For some persons, even though nearby objects can be seen clearly, they may not be able to see distant objects clearly. This defect is farsightedness.
4. Which one of the following is used for rearview in vehicles. (1)
   a. Convex mirror
   b. Concave mirror
   c. Plane mirror
5. According to New cartesian sign convention the sign of focal length of a convex lens is ..... (1)

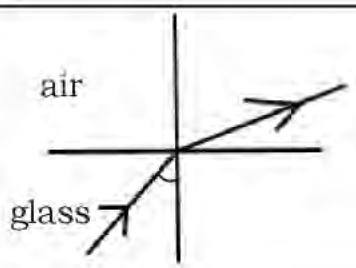
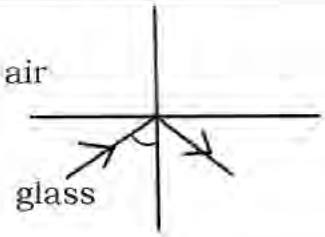
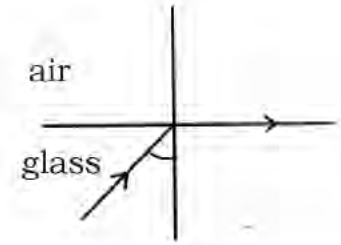
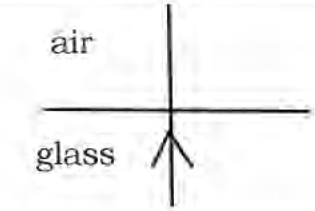
Answer any four questions from 6 to 10. Each carries 2 score

6. What is the power of an electric applience having 880 Ω resistance, design to work at 220 V. (2)
7. Observe the figuere. (2)

   a. Write the name of parts A,B
   b. What is the the working principle of this device.



8. Find out and match the appropriate angle of incidence from B for each figure in A. (2)

A	B
a) 	i) 42°
b) 	ii) 40°
c) 	iii) 0°
d) 	iv) 44°

9. I A current is flowing through the primary coil of a transformer and 4 A through the secondary . Secondary voltage of this trnasformer is found to be 200 V.
   a. Which type of transformer is this (1)
   b. Find out the primary voltage of this trnasfomer. (2)

10. Two plane mirrors are arranged with an angle of 45^0.
   a. How many images are formed when an object is placed in front of this arrangement. (1)
   b. Write any two features of the image formed by a plane mirror. (1)

Answer any four questions from 11 to 15 . Each carries 3 score

11. Observe the figure

a. Identify the colours represented by A and B (1)

b. Name the phenomenon responsible for the spliting of light from the torch to its constituent colours. (1)

c. What is the reason for difference in deviation of the constituent colours (1)

12. Safety fuse is used to ensure safety in electrical circuits.

a. To which line safety fuse connected to electrical circuits. (1)

(Neutral line , Phase line , Earth line)

b. Which material is used as fuse wire. (1)

c. Write the circumstances that causes high electric current in the circuit. (1)

13. Observe the figure.

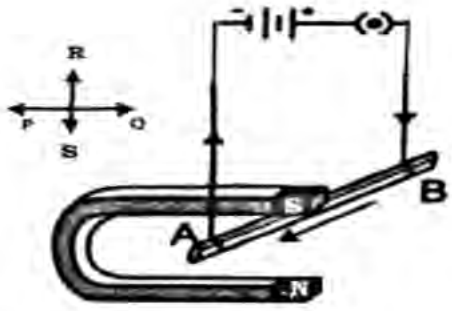


Figure shows a straight conductor AB which is placed in the magnetic field of an U magnet .

a. While switch on the circuit, in which direction will the conductor AB move. (1)

b. Which law helps to find the direction of motion of the conductor? (1)

c. Write two factors that affect the speed of motion of the conductor. (1)

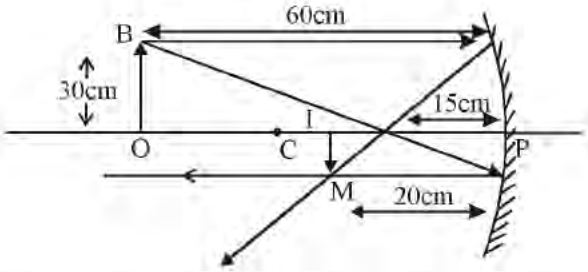
14. Both ELCB and MCB are used in house hold electrical circuits.

a. What is the functional difference between ELCB and MCB. (1)

b. Draw the symbol of earthing. (1)

c. Write the comercial unit of electrical energy. (1)

15. Observe the picture

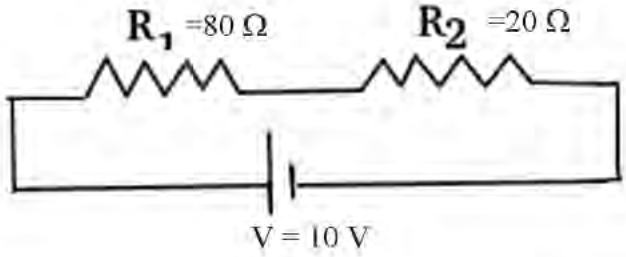


a. Find out the height of the image by using the given dimensions in the figure? (2)

b. Define magnification. (1)

Answer any four questions from 16 to 20. Each carries 4 score.
(4 × 4 =16)

16. Observe the figure.



a. Which of the two resistors get heated more (R_1/R_2) (1)

b. Calculate the current flowing through the circuit. (1)

c. Find out the heat generated in the resistor R_1 if the current flows through the circit for 1 minute.

17. We get different forms of energy from the sun.

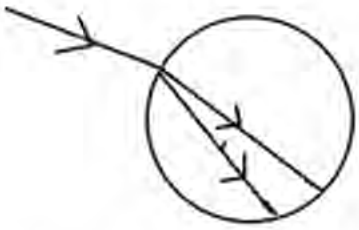
a. What is the name of the phenomenon which converts solar energy into electrical energy in solar cells? (1)

b. Why is hydrogen not used as domestic fuel despite its high calorific value? (1)

c. Write one example each of green energy and brown energy? (1)

d. Name two household appliances which are using to reduce energy consumption? (1)

18. Observe the image of sunlight entering into a water drop.

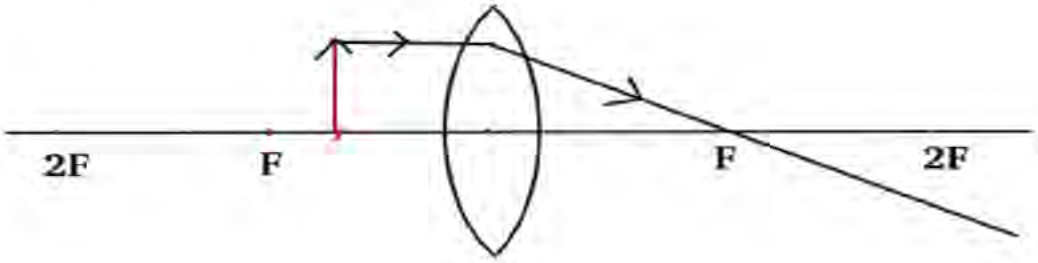


a. Copy and draw the picture and illustrate the subsequent path of the light rays and mark the colours. (2)

b. Which phenomena of light causes the path of light ray like this. (1)

c. What causes the different colours of the rainbow to appear in the shape of an arc? (1)

19. A diagram related to image formation is given.



a. Copy and draw this figure and complete it to get the image. (1)

b. Write the characteristics of the image. (1)

c. Magnification of the image (less than 1/geater than 1) (1)

20 About ten persentage of all electrical accidents in India occur in our state.

a) What are the precautions to be taken to avoid electric shock? (4 numbers) (2)

b) What is the first aid to be given to a person suffering from electric shock? (4 numbers) (2)

ASSESSMENT TOOL Set 2

PHYSICS

Time : 1½ Hours Total Score : 40

Instructions

- First fifteen minutes is cool off time
- Read the questions and instructions carefully before writing the answers
- While answering the questions , consider score and time

Answer any 4 of the questions from 1 to 5. (1 score each) (4 × 1 = 4)

1. In which type of mirror the values of u and v never become equal
   (Plane Mirror, Convex Mirror, Concave Mirror) (1)
2. Find the first word pair relation and complete the second word pair. (1)
   Safety fuse: An alloy of tin and lead
   Incandescent Lamp : ——————————
3. Check the laws of refraction given below and correct it, if there is mistake in it.
   a) The incident ray, the refracted ray and the normal are in the same plane.
   b) The ratio of the sine values of the angle of incidence to the value angle of refraction will always be a constant. (1)
4. Draw a graphical representation of the emf produced by a DC generator.(1)
5. In an electric motor, after each half-rotation, the current in the circuit is reversed by (1)

Answer any 4 of the questions from 6 to 10. (2 score each)

6. Match the following. (2)

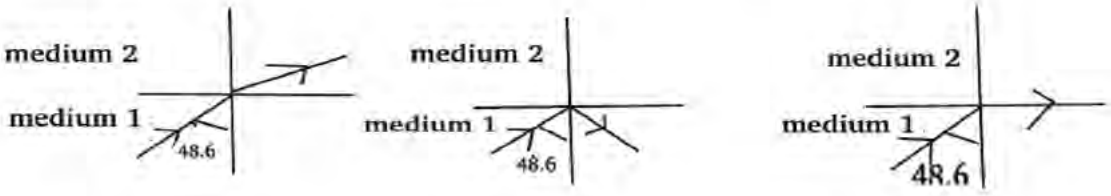
A	B
a) Coal	i) Methane
b) LNG	ii) carbon di oxide
c) Bio gas	iii) carbon
d) LPG	iv) Methane &carbon di oxide
	v) Butane

7. Light rays from the sun strikes the dust and air molecules and reflect back in the Earth's atmosphere.
   a) In which circumstances the rate of scattering of all colours becomes equal? (1)
   b) Explain tintel effect. (1)

8. Excessive use of light is a cause of light pollution.
   a) Write any two consequences of light pollution. (1)
   b) Write any two ways to reduce light pollution. (1)
9. If a house 4 LED lamps of 25 W works for 5 hours and a TV of 100 W works for 5 hours in a day, calculate the units of electricity consumed in a day.
10. Write 4 advantages of LED bulb, comparing with other types of bulbs.(2)

Answer any 4 of the questions from 11 to 15. (3 score each)

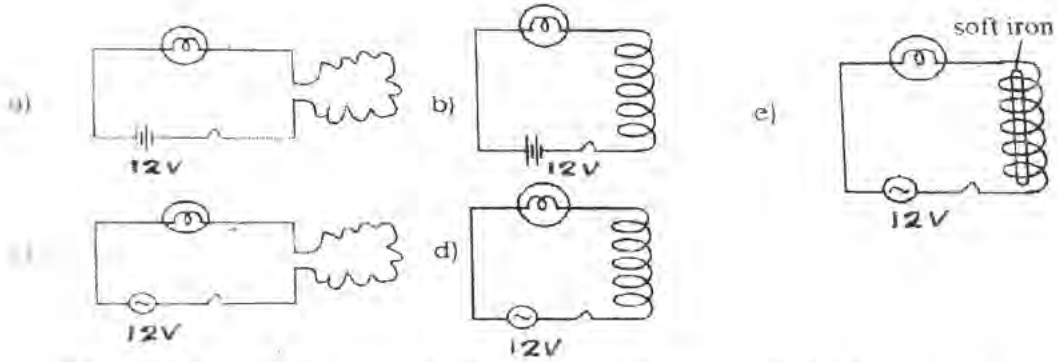
11. Observe the figure.



   a. Which of the given figures is likely to have medium 1 as water and medium 2 as air? (1)
   b. Justify your answer with two reasons. (2)

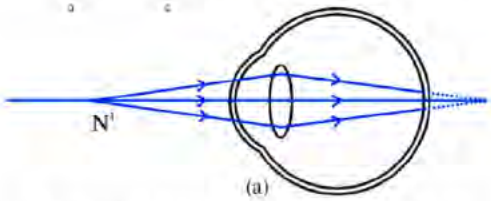
12. Two heaters of resistances 1200 Ω and 600 Ω connected to a 200 V supply and allowed current to flows through the resistors them for 10 minutes.
   a Which heater produces more heat? (1)
   b. Justify your answer. (2)

13. Copper wires of the same length and thickness are connected as coiled or not coiled in below five circuits.Observe the circuits and answer the following questions.



   a. Which of the following bulbs have minimum light intensity. (1)
   b. Name the phenomenon causes the intensity of bulbs decreases.?(1)
   c. Define the phenomenon. (1)

14. Diagram of the formation of an image in the eye of a visually impaired person.



a. What type of visual impairment is this? (1)

b. Write the reasons for the occurrence of this type of defect. (1)

c. How can this defect be solved? (1)

15. Calorific value is one quality that good fuels should have.

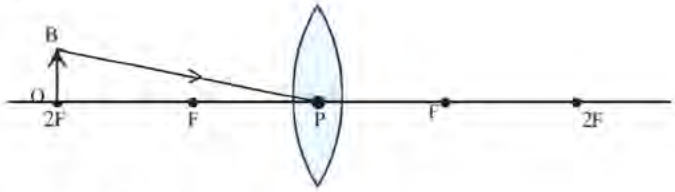
a) What is meant by calorific value of a fuel? (1)

b) Which fuel has the highest calorific value known? (1)

c) Can this fuel be used for domestic purposes? Validate the answer. (1)

Answer any four questions from 16 to 20 . Each carries 4 score.
(4 × 4 = 16)

16 Observe the figure.



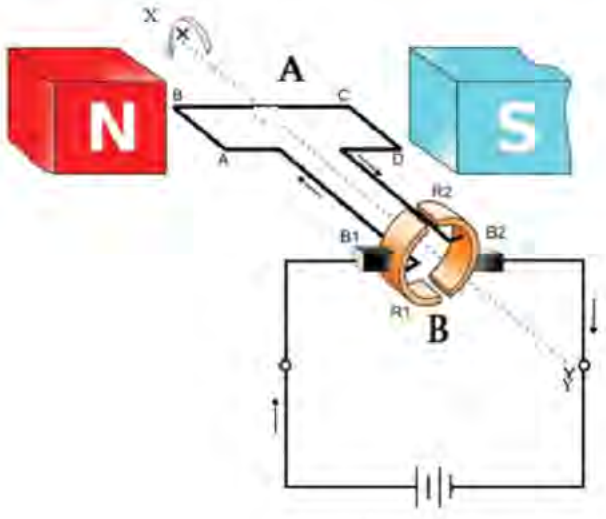
Object is placed at 2F of a convex lens.

a) Copy the image and complete the ray diagram. (2)

b) Write any two features of the image formed here. (1)

c) Calculate the magnification of the image , if the height of the image is 2 cm. (1)

17. Observe the figure.

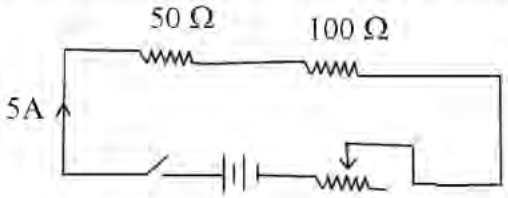


a. Write the name of the parts A and B. (1)

b. Write the enrgy change takes place in this device. (1)

c. Which law helps to determine the direction of the mooving part in this apparutus.State the law. (2)

18. Through the given ciecuit, 5 A current flows in 5 minutes.



a. Name the arrangement of resistors in this electric circuit? (1)

b. Which resistor produces more heat? (1)

c. Calculate the heat generated in the 100 Ω resistor. (2)

19. An object is placed 30 cm away from a concave mirror of focul length 10 cm.

a. Find out the distance of the image from the mirror. (2)

b. What are the features of the image formed. (1)

c. Write any one use of this mirror. (1)

20. A transformer without power loss has 5000 turns in the primary and 500 turns in the secondary. The voltage across the primary is 120 V and the current is 0.1 A.

a. What type of transformer is this? (1)

b. Find out the voltage in the secondary? (2)

c. What is the power in the primary? (1)